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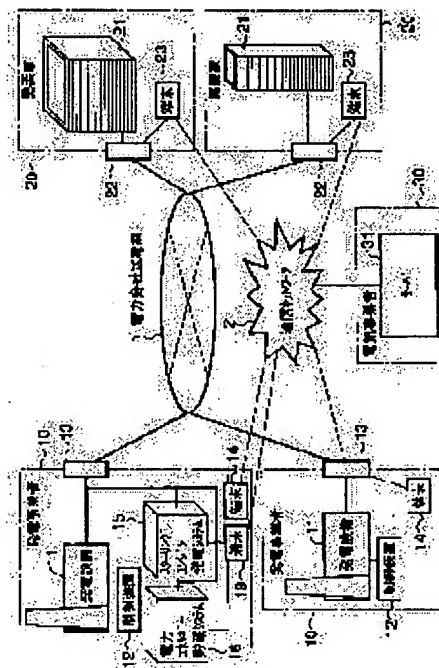
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(54) SURPLUS POWER MANAGEMENT SYSTEM

(57)Abstract:

PROBLEM TO BE SOLVED: To provide a reliable surplus power management system, where electric power or electric energy which electricity users require can be acquired from power generation operators by electric utility operators without fail, and be supplied to the electricity users with stability.

SOLUTION: A Stirling engine generation system 15, capable of supplying power to a transmission network 1, is installed, and the operation of the Stirling engine generation system 15 is controlled according to demand-and-supply balance between the power supply to the transmission network 1 and the electricity usage of customers 20. Excess or deficiency in surplus power supply is eliminated by this control.



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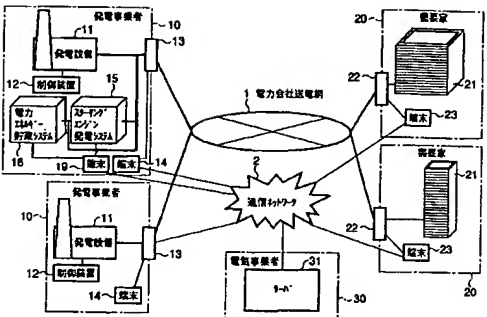
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最終頁に続く

(54) 発明の名称 余剰電力管理システム

(57) [要約]
【課題】 電力使用者が必要とする電力または電力量を電気事業者が発電事業者から適宜に確保して電力使用者に安定供給することができる信頼性につづけた余剰電力管理システムを提供する。
【解決手段】 送電網1への送電が可能なスターリンクエナジック発電システム15を設け、送電網1への電力供給と需要受入の電力使用との供給バランスに応じてスターリンクエナジック発電システム15の運転を制御する。この制御により、余剰電力供給の過不足を解消する。



【特許請求の範囲】

【請求項1】 発電事業者の余剰電力を電気事業者が購入し、その購入電力を送電網により前記発電事業者から電力使用者へ直接的に供給する余剰電力管理システムにおいて、

前記送電網への送電が可能な補助発電手段と、前記送電網への電力供給と前記電力使用者の電力使用との供給バランスに応じて前記補助発電手段の運転を制御する制御手段と、

を具備したことを特徴とする余剰電力管理システム。

【請求項2】 請求項1に記載の余剰電力管理システムにおいて、

前記補助発電手段は、前記送電網への電力供給が前記電力使用者の電力使用に不足となる場合に前記補助発電手段を運転させる手段を有することを特徴とする余剰電力管理システム。

【請求項3】 請求項1に記載の余剰電力管理システムにおいて、

前記補助発電手段は、前記発電事業者の施設内に設けられており、

前記補助発電手段は、前記発電事業者の施設内に設けられ前記補助発電手段を制御する第1端末と、前記電力使用者の施設内に設けられ第2端末と、これら第1および第2端末とのデータ送受信が可能なサーバと、このサーバに設けられ前記各端末とのデータ送受信により前記送電網への電力供給と前記電力使用者の電力使用との供給バランスを監視する手段と、前記サーバに設けられ前記監視結果に応じた制御命令を前記第1端末に送る手段とを有する。

【請求項4】 請求項1に記載の余剰電力管理システムにおいて、

前記補助発電手段は、発電事業者が購入し、その購入電力を送電網により前記発電事業者から電力使用者へ直接的に供給する余剰電力管理システムにおいて、

前記送電網への送電が可能な補助発電手段と、

前記補助発電手段の発電出力の発電または前記余剰電力の充電を可能とし且つ前記送電網への放電が可能なエネルギー貯蔵手段と、

前記送電網への電力供給と前記電力使用者の電力使用との供給バランスに応じて前記補助発電手段の運転および前記エネルギー貯蔵手段の充放電を制御する制御手段と、

を具備したことを特徴とする余剰電力管理システム。

【請求項5】 請求項4に記載の余剰電力管理システムにおいて、

前記制御手段は、前記送電網への電力供給が前記電力使用者の電力使用に不足となる場合に前記補助発電手段を運転または前記エネルギー貯蔵手段を放電させる手段と、前記送電網への電力供給が前記電力使用者の電力使用に過剰となる場合にその過剰分を前記エネルギー貯蔵手段を充電させる手段と、を有することを特徴とする余剰電力管理システム。

【請求項6】 請求項4に記載の余剰電力管理システムにおいて、

前記補助発電手段および前記エネルギー貯蔵手段は、前記発電事業者の施設内に設けられており、

前記補助発電手段は、熱エネルギーを太陽光または外部熱源から採取する採取ユニットと、この採取ユニットで採取された熱エネルギーにより駆動されるスターリンクエナジックと、このスターリンクエナジックの動力で発電する発電機と、を有することを特徴とする余剰電力管理システム。

【請求項7】 請求項1ないし請求項6のいずれかに記載の余剰電力管理システムにおいて、

前記補助発電手段は、熱エネルギーを太陽光または外部熱源から採取する採取ユニットと、この採取ユニットで採取された熱エネルギーにより駆動されるスターリンクエナジックと、このスターリンクエナジックの動力で発電する発電機と、を有することを特徴とする余剰電力管理システム。

【請求項8】 請求項7に記載の余剰電力管理システムにおいて、

前記外部熱源は、前記発電事業者の発電設備の発生熱であることを特徴とする余剰電力管理システム。

【請求項9】 請求項4ないし請求項6のいずれかに記載の余剰電力管理システムにおいて、

前記エネルギー貯蔵手段は、入力電力を直流変換するコンデンサと、このコンデンサの出力端に接続された蓄電ユニットと、この蓄電ユニットの電圧を交流変換するインバータとを有し、このインバータの出力を前記送電網に送出することを特徴とする余剰電力管理システム。

【請求項10】 請求項9に記載の余剰電力管理システムにおいて、

前記蓄電ユニットは、二次電池を有することを特徴とする余剰電力管理システム。

【請求項11】 請求項9に記載の余剰電力管理システムにおいて、

前記蓄電ユニットは、電気二重層コンデンサを有することを特徴とする余剰電力管理システム。

【請求項12】 請求項9に記載の余剰電力管理システムにおいて、

前記蓄電ユニットは、複数の電気二重層コンデンサと、これら電気二重層コンデンサの放電時の電圧変化に伴い、その各電気二重層コンデンサの相互接続のパターンを逐次に切り替える切り替え手段と、を有することを特徴とする余剰電力管理システム。

【請求項13】 発電事業者の余剰電力を電気事業者が購入し、その購入電力を送電網により前記発電事業者から電力使用者へ直接的に供給する余剰電力管理システムにおいて、
前記送電網への送電が可能な補助発電手段と、
前記補助発電手段に設けられその補助発電手段の発電に必要なエネルギーの貯蔵および放出が可能なエネルギー貯蔵手段と、
前記送電網への電力供給と前記電力使用者の電力使用との供給バランスに応じて前記補助発電手段の運転および前記エネルギー貯蔵手段の貯蔵・放出を制御する制御手段と、
を具備したことを特徴とする余剰電力管理システム。
【請求項14】 請求項13に記載の余剰電力管理システムにおいて、
前記補助発電手段は、熱エネルギーを太陽光または外部熱源から採取する採電ユニットと、この採電ユニットで採取された熱エネルギーにより駆動されるスクリーンポンプと、このスクリーンポンプの動力で発電する発電機とを有する。
前記エネルギー貯蔵手段は、前記採電ユニットに設けられ水素吸蔵合金が収容された第1水素吸蔵合金タンクと、前記採電ユニット外に設けられ外部から熱エネルギーを回収することが可能な恒温槽と、この恒温槽に設けられ水素吸蔵合金が収容された第2水素吸蔵合金タンクと、前記第1水素吸蔵合金タンクと前記第2水素吸蔵合金タンクとの相互間に接続された水素輸送管と、この水素輸送管に設けられた開閉弁とを有することを特徴とする余剰電力管理システム。
【請求項15】 発電事業者の余剰電力を電気事業者が購入し、その購入電力を送電網により前記発電事業者から電力使用者へ直接的に供給する余剰電力管理システムにおいて、
前記送電網に供給される電力を検出する第1検出手段と、
前記送電網から前記電力使用者に取り込まれる電力を検出する第2検出手段と、
前記第2検出手段の検出結果に基づいて前記電力使用者の電力需要を推定する推定手段と、
前記推定された電力需要に相当する電力を前記発電事業者から前記送電網に送出させるための発電計画を決定する決定手段と、
前記決定された発電計画を前記発電事業者に通ずる通知手段と、
前記第1検出手段の検出結果と前記第2検出手段の検出結果との対比に基づいて、現時点より先の電力供給と電力使用との供給バランスを予測し、その予測結果に応じて前記発電事業者の供給電力に対する増減値を規定する予測手段と、
前記規定された増減値を前記発電事業者に指令する指令

手段と、
前記送電網への送電が可能な補助発電手段と、
前記補助発電手段の出力の充電または前記余剰電力の充電を可能とし且つ前記送電網への放電が可能なエネルギー貯蔵手段と、
前記指令の後、前記第1検出手段の検出による電力供給が、前記指令された増減値を含む所定値またはその所定値を基準とする制御許容範囲から外れている場合、その外れ方向が不足側であれば前記補助発電手段を運転または前記エネルギー貯蔵手段を放電させ、外れ方向が過剰側となる場合にその過剰分を前記エネルギー貯蔵手段を充電させる制御手段と、
を具備したことを特徴とする余剰電力管理システム。
【請求項16】 請求項15に記載の余剰電力管理システムにおいて、
前記推定手段は、前記電力使用者に固有の基礎データ、および前記電力使用者の現地気象データなどに基づき、電力需要を推定することを特徴とする余剰電力管理システム。
【請求項17】 請求項15に記載の余剰電力管理システムにおいて、
前記推定手段は、予め設定されている単位計測時間の次回分について、またはその次回分とそれに続く複数回の単位計測時間について、推定を行うことを特徴とする余剰電力管理システム。
【発明の詳細な説明】
【0001】
【発明の属する技術分野】 本発明は、発電事業者の余剰電力を電気事業者が購入し、その購入電力を電力会社の送電網を利用して発電事業者から電力使用者に直接的に供給する、いわゆる電力小売り事業に適用される余剰電力管理システムに関する。
【0002】
【従来の技術】 近年、人間社会の発達とともに、情報産業とこれに関わる生活物品の量産化と流通の拡大、各種電子機器の製造、普及、消費の活発化、交通システムの高速度化、量的拡大、食料の世界的規模での流通など生産、流通を中心とした活動の活発化が特に顕著になってきた。それに伴い、電力、エネルギー使用形態の多様化や使用量の大幅な増大が起ってきた。
【0003】 一方で、化石燃料を中心とした現在のエネルギー体系において、化石燃料の燃焼産物の汚染が取り沙汰され、かつ、排ガス、廃棄物による地球汚染が懸念されるようになって、地球規模での環境保全、エネルギーの有効利用が叫ばれるようになった。
【0004】 人間社会に発展に伴う電力を中心としたエネルギーの使用形態の多様化、使用量の増大は今後も継続するものと予測され、かつ、地球規模での環境保全、エネルギーの有効利用も当然、ますます重要な課題とな

【0005】 こうした状況にあつて、電力、ガスなどのエネルギーの使用形態の多様化に対応した様々な形態のエネルギー供給システムの提供や、エネルギー使用価格の低廉化を図り、より高度で満足のいくエネルギー供給体制を構築していくために、電力、ガスなどのエネルギー産業の規制が緩和され、自由化が図られている。
【0006】 電力事業の自由化に対しては、従来の一般電気事業者（以下、電力会社という）だけでなく、電力の供給を電力使用者（以下、需要家）に行う目的で、新たな事業者、すなわち特定規模電気事業者（以下、電気事業者という）が電力販売事業を行うことになる。
【0007】
【発明が解決しようとする課題】 しかしながら、原子力発電所、火力発電所、水力発電所などの多価値、かつ大規模の発電所を多数保有し、各需要家の使用電力量の変化に対応して、いろいろ発電量を仔細に調整する必要のない電力会社と異なり、限定された数量の発電所を保有し、あるいは発電所を保有せず契約発電事業者から電力供給を受けるのみの電気事業者の場合は、需要家が必要とする電力または電力量を推定し、これに合致した電力または電力量を自己の発電所あるいは契約発電事業者から需要家に供給するために、随時、その調整を實施しなればならぬ。
【0008】 なぜならば、需要家の推定必要電力または推定必要電力量を確保するために、過剰な電力または電力量を発電すれば、エネルギーの有効利用という世界規模の問題に違反するばかりか、採算が取れずに事業の継続が困難となる。
【0009】 かといって、需要家の推定必要電力または推定必要電力量に対してきりぎりしの電力または電力量を供給する体制では、もし、予想外の気温の上昇や低下といった気象条件の変化あるいは突如に關する予想外の異常の集中など、不測の事態が生じると、需要家の必要電力量が増えて供給量不足を招くことがある。
【0010】 この場合、発電事業者から需要家への電力供給が、委託した電力会社の送電網を借りて行われる状況であれば、その送電網には当然ながら電力会社が所有する電力も流れているために、供給量不足となつた分の電力または電力量が自動的に電力会社から断られる形となり、需要家は量が増えないものの、電気事業者から電力会社から高額な補償金が要求されてしまう。こうなると、電気事業者にとっては、採算が取れずに事業の継続が困難となる恐れがある。
【0011】 従つて、電気事業者にとっては、契約した各需要家に、予想され得る必要電力または必要電力量の総計を満たす発電機を自ら所有したり、あるいは発電事業者と契約して必要電力または必要電力量を確保することが必要となる。
【0012】 従来は、法的規制により、需要家に対する

電力供給は一部の限定された発電事業者が独占的にこれを実施している。これらの発電事業者は、契約した需要家の使用する電力・電力量に対してそれを大幅に上回る規模の発電電力・発電電力量を實現する多数の発電所を建設し所有しているが、需要家の使用電力・使用電力量にきめ細かく対応する技術を持っていないのが現状である。
【0013】 この発明は上記の事情を考慮したもので、その目的とするところは、電力使用者が必要とする電力または電力量を電気事業者が発電事業者から需要家に提供して電力使用者に安定供給することができると信頼性にすぐれた余剰電力管理システムを提供することにある。
【0014】
【課題を解決するための手段】 請求項1に係る発明の余剰電力管理システムは、発電事業者の余剰電力を電気事業者が購入し、その購入電力を送電網により前記発電事業者から電力使用者へ直接的に供給するものであつて、送電網への送電が可能な補助発電手段と、送電網への電力供給と電力使用者の電力使用との供給バランスに応じて上記補助発電手段の運転を制御する制御手段と、を備えている。
【0015】 請求項2に係る発明の余剰電力管理システムは、請求項1に係る発明において、制御手段について限定し、制御手段は、送電網への電力供給が電力使用者の電力使用に対して不足となる場合に補助発電手段を運転させる手段を有している。
【0016】 請求項3に係る発明の余剰電力管理システムは、請求項1に係る発明において、補助発電手段および制御手段について限定し、補助発電手段は、発電事業者の施設内に設けられている。制御手段は、発電事業者の施設内に設けられ上記補助発電手段を制御する第1端末と、電力使用者の施設内に設けられている第2端末と、これら第1および第2端末とのデータ送受信が可能なサーバと、このサーバに設けられ上記各端末とのデータ送受信により送電網への電力供給と電力使用者の電力使用との供給バランスを監視する手段と、上記サーバに設けられ上記監視結果に基づいた制御指令を上記第1端末に送る手段とを有している。
【0017】 請求項4に係る発明の余剰電力管理システムは、発電事業者の余剰電力を電気事業者が購入し、その購入電力を送電網により前記発電事業者から電力使用者へ直接的に供給するものであつて、送電網への送電が可能な補助発電手段と、この補助発電手段の発電出力の充電または上記余剰電力の充電を可能とし且つ送電網への放電が可能なエネルギー貯蔵手段と、送電網への電力供給と電力使用者の電力使用との供給バランスに応じて上記補助発電手段の運転および上記エネルギー貯蔵手段の充電を制御する制御手段と、を備えている。
【0018】 請求項5に係る発明の余剰電力管理システムは、請求項4に係る発明において、制御手段について

限定している。制御手段は、送電網への電力供給が電力使用者の電力使用に不足となる場合に上記補助発電手段を運転または上記エネルギー貯蔵手段を放電させる手段と、送電網への電力供給が電力使用者の電力使用に不足となる場合にその過剰分を上記エネルギー貯蔵手段を充電させる手段と、を有している。

[0019] 請求項6に係る発明の余剰電力管理システムは、請求項4に係る発明において、補助発電手段、エネルギー貯蔵手段、および制御手段について限定している。補助発電手段は、発電事業者の施設内に設けられている。制御手段は、発電事業者の施設内に設けられ上記補助発電手段および上記エネルギー貯蔵手段を制御する第1端末と、電力使用者の施設内に設けられている第2端末と、これら第1および第2端末とのデータ送受信が可能なサーバと、このサーバに設けられ上記各端末とのデータ送受信により送電網への電力供給と電力使用者の電力使用との隔絶バランスを監視する手段と、上記サーバに設けられ上記監視結果に応じた制御指令を上記第1端末に送る手段とを有している。

[0020] 請求項7に係る発明の余剰電力管理システムは、請求項1ないし請求項6のいずれかに係る発明において、補助発電手段について限定している。補助発電手段は、熱エネルギーを太陽光または外部熱源から採取する採取ユニットと、この採取ユニットで採取された熱エネルギーにより駆動されるスターリングエンジンと、このスターリングエンジンの動力で発電する発電機と、を有している。

[0021] 請求項8に係る発明の余剰電力管理システムは、請求項7に係る発明において、外部熱源について限定している。外部熱源は、発電事業者の発電設備の発生熱である。

[0022] 請求項9に係る発明の余剰電力管理システムは、請求項4ないし請求項6のいずれかに係る発明において、エネルギー貯蔵手段について限定している。エネルギー貯蔵手段は、入力電力を直流変換するコンバータと、このコンバータの出力端に接続された蓄電ユニットと、この蓄電ユニットの電圧を交流変換するインバータとを有し、このインバータの出力を前記送電網に送出する。

[0023] 請求項10に係る発明の余剰電力管理システムは、請求項9に係る発明において、蓄電ユニットについて限定している。蓄電ユニットは、二次電池を有している。

[0024] 請求項11に係る発明の余剰電力管理システムは、請求項9に係る発明において、蓄電ユニットについて限定している。蓄電ユニットは、電気二重層コンデンサを有している。

[0025] 請求項12に係る発明の余剰電力管理システムは、請求項9に係る発明において、蓄電ユニットに

ついて限定している。蓄電ユニットは、複数の電気二重層コンデンサと、これら電気二重層コンデンサの放電時の電圧変化に伴いその各電気二重層コンデンサの相互接続のバターンを逐次に切替える切替手段と、を有している。

[0026] 請求項13に係る発明の余剰電力管理システムは、発電事業者の余剰電力を電気事業者が購入し、その購入電力を送電網により前記発電事業者から電力使用者へ直接に供給するものであって、送電網への送電が可能な補助発電手段と、この補助発電手段に設けられその補助発電手段の発電に必要なエネルギーの貯蔵および放出が可能なエネルギー貯蔵手段と、送電網への電力供給と電力使用者の電力使用との隔絶バランスに応じて上記補助発電手段の運転および上記エネルギー貯蔵手段の貯蔵、放出を制御する制御手段と、を備えている。

[0027] 請求項14に係る発明の余剰電力管理システムは、請求項13に係る発明において、補助発電手段およびエネルギー貯蔵手段について限定している。補助発電手段は、熱エネルギーを太陽光または外部熱源から採取する採取ユニットと、この採取ユニットで採取された熱エネルギーにより駆動されるスターリングエンジンと、このスターリングエンジンの動力で発電する発電機とを有している。エネルギー貯蔵手段は、上記採取ユニットに設けられ水素吸蔵合金が収容された第1水素吸蔵合金タンクと、上記採取ユニット外に設けられ外部から熱エネルギーを取り込むことが可能な恒温槽と、この恒温槽に設けられ水素吸蔵合金が収容された第2水素吸蔵合金タンクと、上記第1水素吸蔵合金タンクと上記第2水素吸蔵合金タンクとの相互間に接続された水素輸送管と、この水素輸送管に設けられた開閉弁とを有している。

[0028] 請求項15に係る発明の余剰電力管理システムは、発電事業者の余剰電力を電気事業者が購入し、その購入電力を送電網により前記発電事業者から電力使用者へ直接に供給するものであって、送電網に供給される電力を抽出する第1検出手段と、送電網から電力使用者に取り込まれる電力を抽出する第2検出手段と、この第2検出手段の抽出結果に基づいて電力使用者の電力需要を推定する推定手段と、この推定された電力需要に相当する電力を発電事業者から送電網に送出させるための発電計画を決定する決定手段と、この決定された発電計画を発電事業者に通ずる通知手段と、上記第1検出手段の検出結果と上記第2検出手段の検出結果との対比に基づいて、現時点より先の電力供給と電力使用との隔絶バランスを予測し、その予測結果に基づいて発電事業者の供給電力に対する増減量を設定する予測手段と、この設定された増減量を発電事業者に指令する指令手段と、送電網への送電が可能な補助発電手段と、この補助発電手段の出力の充電または上記余剰電力の充電を可能とし且つ送電網への放電が可能なエネルギー貯蔵手段と、上

記指令後、上記第1検出手段の検出による電力供給が、上記指令された増減量を含む所定値またはその所定値を基準とする制御許容範囲から外れている場合、その外れ方向が不足側であれば上記補助発電手段を運転または上記エネルギー貯蔵手段を放電させ、外れ方向が過剰側となる場合にその過剰分を上記エネルギー貯蔵手段を充電させる制御手段と、を備えている。

[0029] 請求項16に係る発明の余剰電力管理システムは、請求項15に係る発明において、推定手段について限定している。推定手段は、電力使用者に固有の基礎データ、および同電力使用者の現地気象データなどに基づき、電力需要を推定する。

[0030] 請求項17に係る発明の余剰電力管理システムは、請求項15に係る発明において、推定手段について限定している。推定手段は、予め設定されている単位計測時間の回数分について、またはその次回分とそれ以降に続く回数分の単位計測時間について、推定を行う。

[0031] 発明の要約の形態 [1] 以下、この発明の第1の実施形態について図面を参照して説明する。図1において、10は電気事業者と契約した発電事業者で、発電設備11、この発電設備11を制御するための制御装置12、発電設備11から後述の送電網1に供給される電力の値および電力量を抽出したと見做す計測器(第1検出手段)13、この計測器13に接続されたコンピュータ等の端末(第1端末)14を所有している。計測器13は、電力の値および電力量のほかに、力率を計測する。

[0032] このような発電事業者10が複数あり、それぞれが発電設備11の発電電力うち、発電事業者10の本来の用途に使用する電力を超える分のいわゆる余剰電力が、特定規模電気事業者(以下、電気事業者と略称する)30に購入される形で電力会社送電網1に供給される。この送電網1は、電気事業者30とは別の電力会社が所有する設備である。この送電網1を所有する電力会社が電気事業者30が送電を委託することにより、電気事業者30が各発電事業者10から購入した余剰電力が、送電網1を介して各発電事業者10から複数の電力使用者(以下、需要家と称する)20に直接的に供給される。

[0033] 各需要家20は、送電網1から電力を取り込んで内部の負荷設備の運転に使用する建物21、この建物21に取り込まれる電力の値および電力量を抽出したと見做す計測器(第2検出手段)22、この計測器22に接続されたコンピュータ等の端末(第2端末)23を所有している。計測器22は、電力の値および電力量のほかに、力率を計測する。

[0034] 電気事業者30は、各発電事業者10の余剰電力を購入する契約を各発電事業者10と交わし、その購入した電力を各需要家30に販売する契約を各需要

家20と交わし、かつ上記のように送電網1の所有者との間で送電委託の契約を交わし、余剰電力の購入から供給までの管理を行うもので、制御装置としてサーバ31を備えている。サーバ31は、各発電事業者10の端末14および各需要家20の端末23との間でインターネット等の通信ネットワーク2を介したデータ送受信が可能である。また、図示していないが、サーバ31は、送電を委託している電力会社の端末に対しては通信ネットワーク2を介したデータ送受信が可能となっている。[0035] なお、各発電事業者10において端末14に制御装置12を信号線接続し、サーバ31から端末14への送信内容をそのまま発電設備11に対する発電機制御用データとして制御装置12に送るようになっている。

[0036] このような構成において、1つまたは複数の発電事業者10の施設内に、補助発電手段であるスターリングエンジン発電システム15、エネルギー貯蔵手段である電力エネルギー貯蔵システム16、および端末19が設けられている。

[0037] スターリングエンジン発電システム15は、発電設備11と制御装置13との間の電力線18に接続され、運転により発電した電力を送電網1へ送電することが可能である。

[0038] 電力エネルギー貯蔵システム16は、蓄電ユニットを有し、電圧線18に供給される余剰電力のうち需要家20の使用に供せられない過剰分を充電したり、電力エネルギー貯蔵システム16の発電電力の過剰分を充電したり、さらに、蓄えた電力を必要に応じて送電網1へ放電する機能を有している。

[0039] 端末19は、上記サーバ31との間で上記通信ネットワーク2を介したデータ送受信が可能であり、そのサーバ31と共に、スターリングエンジン発電システム15の運転および電力エネルギー貯蔵システム16の充放電を制御する制御手段を構成している。

[0040] スターリングエンジン発電システム15、電力エネルギー貯蔵システム16、およびその周辺部の構成を図2に示している。

[0041] 発電設備11は、いわゆる汽力発電設備であり、発電機40、この発電機を駆動する蒸気タービン41、この蒸気タービン41を駆動する蒸気発生器42、この蒸気発生器42で得られる水を蒸気がイラ44に送る送水ポンプ43、蒸気がイラ44で発生する蒸気を過熱する過熱器45を備えている。発電機40の発電電力のうち、本来の用途に使用する電力を超える分の余剰電力が、電力線18および計測器13を介して送電網1に送出される。

[0042] スターリングエンジン発電システム15は、スターリングエンジン51、このスターリングエンジン51の動力で発電する発電機52、スターリングエンジン51を駆動するための熱エネルギーを太陽光また

は外部熱源から採取する採取ユニット50、外部熱源と
 とは熱交換器44の発生熱を熱媒体管53の熱媒体管53
 取ユニット50に導く。熱媒体管53、この熱媒体管53
 に設けられた流通制御用の閉閉弁54などを備え、端末
 19により運転が制御される。このスターリングエンジ
 ン発電システム15の出力端子（発電機52の出力端
 子）が、端末19の指令に応動する閉閉弁52に接続され
 るとともに、同じく端末19の指令に応動する閉閉ス
 イッチ70bを介して電力エネルギー貯蔵システム16の
 入力端子に接続されている。

【0043】このスターリングエンジン発電システム1
 5の具体例を図3に示している。採取ユニット50は、
 断熱材で形成された本体の内側空間を集光部50aとし
 て備え、その集光部50aに上記熱媒体管53の一部お
 よびヒートパイプ55の先端部を臨ませ、そのヒートパ
 イプ55の基部部にスターリングエンジン51を装着す
 るとともに、集光部50aの集光用開口に集光レンズ5
 6および集光板57を装着して太陽光を集めるようにし
 ている。すなわち、太陽光が集光部50aに集められ
 ることにより、あるいは閉閉弁54が開放されて熱交換
 器44の熱が熱媒体管53を介して集光部50aに放熱
 されることにより、集光部50aの内部温度が上昇し、
 その熱エネルギーがヒートパイプ55によってスター
 リングエンジン51に伝わることにより、スターリングエ
 ンジン51が動作する。この動力により発電機52が駆
 動される。集光板57は、仰向の面が平滑で、その角
 度調節用にモータ60が設けられている。また、太陽光
 の光量を検知する光センサ61が集光板57の内側に設
 けられている。さらに、温度センサ62が集光部50a
 内に設けられている。

【0044】一方、電力エネルギー貯蔵システム16
 は、入力電力（交流電力）を直流変換するAC/DCコ
 ンバータ71、このコンバータ71に逆流防止用ダイオ
 ード72および双方方向性スイッチ74の一方の接点を介
 して接続された蓄電ユニット73、この蓄電ユニット7
 3に閉閉スイッチ75、逆流防止用ダイオード76、お
 よび双方方向性スイッチ74の他方の接点を介して接続さ
 れたその蓄電ユニット73の電圧を交流変換するインバ
 ータ77、これらコンバータ71、双方方向性スイッ
 チ74、閉閉スイッチ75の動作を端末19からの指令に応
 じて制御するとともに蓄電ユニット73の状態を監視し
 てその監視データを端末19に送る保護制御部78など
 を備えている。この電力エネルギー貯蔵システム16の
 出力端子（インバータ77の出力端子）が、電磁遮断器
 17bを介して電力線18に接続されている。

【0045】蓄電ユニット73は、図4に示すように、
 複数の二次電池（セル）B1、B2、…Bnからなる組
 電池80を備えている。二次電池B1、B2、…Bn
 は、電力エネルギーを効率的かつ比較的長時間貯蔵で

き、しかも貯蔵したエネルギー量の経時的な低下速度が
 小さく、しかも貯蔵エネルギー量の放出をできる限り短時
 間に行うことが可能な、鉛電池、ニッケルカドミウム電
 池、ニッケル水素電池（Ni/MH電池）、リチウムイ
 オン電池（Liイオン電池）などである。これらの電池
 は、製品として広範に市場で販売され、直置による断
 格低廉が図られ、充電制御法も確立され、さらに長寿命
 化や高温対策の技術も進展しており、比較的高い信頼性
 が期待できるもので、それぞれ両端が状態判定用（劣化
 判定用、充電電力量の判定用）として保護制御部78に
 リード線接続されている。充電電力量の判定について
 は、検出データと基準データとの比較演算により行われ
 るが、この比較演算は保護制御部78で行っても、電気
 事業者300のサーバ31側で行っても、そのいずれでも
 よい。

【0046】なお、供給条件（電圧、電流の条件）に応
 じて各二次電池の容量、サイズ、個数を設定し、かつこ
 れら二次電池を最適な直並列に配列してモジュール化
 し、これらモジュールを必要数だけ最適な直並列に接続
 して構成するのが好ましい。この構成については、電池
 寿命を把握し、かつ寿命時の容量を考慮して決定する。
 電池寿命は、好ましくは数年以上、さらに好ましくは1
 0年以上となる電池を選択する。寿命が数年未満である
 と電池交換が頻繁になり交換電池および交換作業に要す
 るコストが高くなり好ましくない。

【0047】設置面積があまり制約を受けず、かつコス
 ト削減を重視する場合には、鉛電池の採用が最も有効で
 ある。設置面積に大きな制約がなく、コスト重視であ
 り、比較的頻りに使用し、かつ重負荷が必要である場
 合は、ニッケルカドミウム電池が最も有効である。設置面
 積がある程度制約を受け、比較的頻りに使用し、重負荷
 であるが、コスト面での制約があまりない場合には、ニ
 ッケル水素電池が最も有効である。設置面積が大きく制
 約され、逆にコスト面での制約があまりない場合には、
 リチウムイオン電池が最も有効である。

【0048】また、二次電池B1、B2、…Bnの個々
 について、必要ならば電圧センサ、電流センサ、温度の
 センサ、さらに必要ならば電池ケースの歪みセンサなど
 を設け、安全性と信頼性を管理する。この管理は、保護
 制御部78や端末19でデータサブソブリングしながら行
 っても、あるいは同様に発電事業者300の端末14や行政
 事業者300のサーバ31にデータ伝送して行ってもよ
 い。

【0049】このような電力エネルギー貯蔵システム1
 6では、保護制御部78によって蓄電ユニット73に対
 する補充充電が実施される。この補充充電の処理を示
 している。

【0050】蓄電ユニット73の充電電力量Uが保護制
 御部78で計測されており、その充電電力量Uが自己放
 電や使用により減少して予め定められている規定値U_s

未満になると、スターリングエンジン発電システム15
 が駆動され、そのスターリングエンジン発電システム1
 5の発電電力が閉閉スイッチ70bのオンによって電力
 エネルギー貯蔵システム16に取り込まれる。電力エネ
 ルギー貯蔵システム16では、スターリングエンジン発
 電システム15の出力がコンバータ71で直流変換され
 る。それが双方方向性スイッチ74の一方の接点のオンに
 よって蓄電ユニット73に印加される。こうして、蓄電
 ユニット73が補充充電される。なお、電力線18上の余
 剰電力に需要家200の使用に供されない過剰分が生じて
 いる場合は、電力線18上の電力を開閉スイッチ70
 a、70bのオンによって電力エネルギー貯蔵システム
 16に取り込み、蓄電ユニット73を補充充電することも
 可能である。

【0051】補充充電中は、蓄電ユニット73の電圧V、
 充電電流I、充電時間tが保護制御部78でモニタリン
 グされており、充電電Uが補充充電U₀と達したのが保護
 制御部78で判断されると、上記補充充電が終了する。

【0052】蓄電ユニット73の残量判定は、一般的に
 は直前の放電時間における電圧、電流、放電時間、必要
 ならば環境温度から、あらかじめ入力しておいた二次電
 池の特性データと比較演算して、放電電量を算定し、
 二次電池の充電電力量の残量を求める。充電において
 は、同じく電圧の変化、電流値、時間、必要ならば環境
 温度をモニタリングし、同様にあらかじめ入力しておい
 た二次電池の特性データと比較演算して補充電量を判定す
 る。なお、二次電池の種類により、必要ならば、端末1
 9は、保護制御部78に充電終了電圧、充電電流の制
 御、時間制御、温度上昇限界を設定して必要な充電制御
 を行うよう指示する。

【0053】放電が必要となった場合、開閉スイッチ7
 5がオンされ、かつ双方方向性スイッチ74の他方の接点
 がオンされ、さらにインバータ71が駆動される。これ
 により、蓄電ユニット73の電圧がインバータ77で交
 流変換され、それが電磁遮断器17bのオンによって電
 力線18に供給される。

【0054】ところで、蓄電ユニット73としては、二
 次電池のほかは、電気二重層コンデンサの採用が考えら
 れる。この例を図6に示している。

【0055】81は複数の電気二重層コンデンサCを有
 するコンデンサバンクで、各電気二重層コンデンサCと
 複数の開閉スイッチSとでバターン切替回路を構成して
 いる。このバターン切替回路の採用により、各電気二重
 層コンデンサCの放電時の電圧変化に伴う各電気二重
 層コンデンサCの相互接続のバターンを各開閉スイ
 ッチSによって逐次に切替えるいわゆるバターン切替可能
 としている。すなわち、電気二重層コンデンサCは、二
 次電池と異なり、放電時間とともに電圧が直線的に低下
 する。そのため、放電時間の経過による電圧の低下をな

るべく小さく抑えながら、各電気二重層コンデンサCの
 充電電量を有効に開始するがよい。

【0056】放電の使用開始時は、まず切替スイッチS1
 1、S12がオンし、図7に示すような2直列・2並列
 の接続パターンが形成される。放電が進んで電圧が第1
 所定値まで低下すると、切替スイッチS11、S12が
 オフして代わりにスイッチS21、S22をオンし、図
 8に示すような並列と直列を組み合わせた接続パター
 ンが形成される。さらに放電が続いて、電圧が第2所定値
 （<第1所定値）まで低下すると、切替スイッチS2
 1、S22がオフして切替スイッチS31がオンし、図
 9に示すように並列と直列の接続パターンが形成される。
 このようになバターン切替により、放電電圧ができるだけ平
 準化され、有効電力量が確保される。

【0057】図10は、バターン切替が有る場合と無い場
 合の放電電圧の変化を比較して示したものである。バ
 ターン切替を実施すると、切替スイッチのオン、オフ切替に
 際して電圧が上昇方向に回復し、バターン切替を実施しな
 い場合に比べて電圧の平坦性が改善され、かつ放電時間
 も長くなる。

【0058】要するに、電気二重層コンデンサCの1個
 分の容量は、水素発電系統で1V台、有機電解液系で
 もせいぜい3Vであることから、複数の電気二重層コン
 デンサCの直列接続と並列接続を組み合わせた、十分な電
 圧と電力量を確保するようにしている。

【0059】本システムに適用される電気二重層コンデ
 ンサCは、スターリングエンジン発電システム15によ
 って発電された電力、または発電機11によって発電
 された電力を一定時間以上かつ一定量以上にわたって蓄え
 る機能と、電力必要時に一定時間以内に一定の電力量を
 放電する機能とを保持する。このため、出力電圧が10
 0W/kg以上、エネルギー密度が5Wh/kg、内部
 抵抗が100ΩF以下の電気二重層コンデンサCが採用
 されている。

【0060】仮に、出力密度が100W/kg未満で
 は、電気事業者300の求める供給電力密度が単位箱電
 荷時間（30分以内が一般的）に実現せず、エネルギー
 密度が5Wh/kg未満では、コンデンサに蓄えられる
 電力量が不足して、電気事業者300の求める単位
 不足をきたし、かつ放電電力を稼ぐにはコンデンサを較
 随する数が増えることになって、いずれも好ましくな
 い。内部抵抗が100ΩFを超えると、電気二重層コン
 デンサCからの放電電力が電気事業者300の求める単位
 時間ごとの電力の需要電力に追いつかず、電気二重層
 コンデンサを較随した意義が失われてしまうことになり、
 これも好ましくない。

【0061】また、電気二重層コンデンサCを構成する
 分離性電極材料、電解液材料は、上述した要求条件が満
 足されれば何ら制限はないが、一例として、電極材料は
 はフェノール系などの有機化合物炭素微布を平均粒径

し、片面に炭電極としてアルミニウム溶射を施した材料、炭化した活性炭などの炭状炭素粉末とカーボンブラックなどの導電剤とテフロン（登録商標）エポキシ樹脂（またはテフロン（登録商標）粉末）とを混練してシート化した片面にアルミニウム箔、または板を貼り付けた材料、ホルムアルデヒド樹脂などの有機化合物の溶、 CO_2 ガスを加熱し、炭素雰囲気下で熱処理するソル、グルンや、有機化合物低分子を高分子化し、熱処理したポリマライゼーション法によって作成した炭電極素を用いて同時にシート化した炭電極を貼り付けた材料、白金系合金、ルテチウムオキサイド、インジウムオキサイドなどの金属炭化物を潤滑シート材料、ポリアセツなどの導電性ポリマーシート材料などが挙げられる。

【0062】電解液材料には、アルカリ金属、アルカリ土類金属などの化合物を溶解させた液、またはアルカリ水溶液の他、テトラフルアルフェニウムテトラフルオロボレートなどの、テトラアルキルアフェニウムイオン（ $\text{R}^1, \text{R}^2, \text{R}^3, \text{R}^4$ 、 N^+ イオン、 $\text{R}, \text{R}^1, \text{R}^2, \text{R}^3, \text{R}^4$ はアルキル基を示す）と PF_6^- 、 BF_4^- などのアニオンとのテトラアルキルアフェニウム塩を溶質としてテフロレンカーボネート PC 、 カンフチ 、 エチレンカーボネート （ PC/EC ）、 $\text{PC}/\text{スルホラ}$ ン（ PC/SL ）などの混合系有機溶媒に溶解させた非水溶媒電解液などが挙げられる。

【0063】これらの材料から選択された一方の分極性電極の間には、セパレータが挟まれ、セパレータの材料としては、紙、ポリエチレン、ポリプロピレン、テフロン（登録商標）の多孔性シートやガラス纖維シートが挙げられる。

【0064】電気二重層コンデンサCは、これらの電極を、セパレータと集電板の間に挟んだ積層にして容器に収納し、電解液を充填して封口する円筒タイプや、電極間にセパレータを介して一体で巻き込んでこれを円筒型容器に収納し電解液を充填して封口する円筒タイプとが考えられる。

【0065】しかしながら、これらは電気二重層コンデンサCを構成する一例を示したのみであり、上述した条件を満たせば何らこれに限定されることはない。

【0066】また、電気二重層コンデンサCに蓄えられた電力量は、自己放電によって随時的に減少する。自己放電速度は、電気二重層コンデンサCの構成や形状、接続電圧などによって異なり、おおよそ30%/monthとされ、鉛電池（3～8%/month）、Liイオン電池（5%/month程度）の5倍速、ニッケルカドミウム電池（10～20%/month）、ニッケル水素電池（15～30%/month）の1～2倍とニ次電池の自己放電より大きい傾向にある。そのため、適宜に補充電を実施する必要があり。

【0067】一方、上記バンプ切替による電力の有効利

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用の方案に加え、信頼性の高い電力制御を実施するため、コンデンサバンプ81に蓄えられている充電電力量（残量）が残量計82で計測され、その計測結果に応じた充放電制御が適用される。

【0068】この補充電の一例を図11のフローチャートに示し、まず、コンデンサバンプ81に蓄えられている充電電力量が残量計82で計測されており、その充電電力量が自己放電や使用により減少して予め定められている規定値 U_s （規定電圧時の電力量の80%）未満になると、スクウェアンジン発電システム15の発電電力が開始スイッチ70bのオンによって電力エネルギー貯蔵システム16に取り込まれる。電力エネルギー貯蔵システム16では、スクウェアンジン発電システム15の出力がコンバータ71で直流変換され、それが双方向性スイッチ74の一方の接点のオンによって蓄電ユニット73に印加される。こうして、コンデンサバンプ81が補充電される。なお、電力線18上の余剰電力に需要家20の使用に供されない過剰分が生じている場合は、スクウェアンジン発電システム15を駆動せずに、電力線18上の電力を開始スイッチ70a、70bのオンによって電力エネルギー貯蔵システム16に取り込み、コンデンサバンプ81を補充電することも可能である。

【0069】補充電中、コンデンサバンプ81の端子電圧Vおよびコンデンサバンプ81への充電電流が保護制御部78で検知され、その端子電圧Vと充電電流Iとの積が求められ、その積が時間経過に伴い加算されていき、その加算値は、上記計測された充電電力量Uと補充電力量との差に相当する充電必要電力量 ΔU に達したとき、コンデンサバンプ81が補充電になったとの判断の下に、補充電が終了される。

【0070】放電が必要となった場合、開始スイッチ75がオンされ、かつ双方向性スイッチ74の他方の接点がおよび、コンデンサバンプ81の電圧がインバータ77で交直変換され、それが電磁変換器17bのオンによって電力線18に供給される。

【0071】この放電に関しては、コンデンサバンプ81の端子電圧Vおよびコンデンサバンプ81からの放電電流が保護制御部78で検知され、その端子電圧Vと放電電流Iと時間との積から放電電力量が求められ、その放電電力量が、放電開始時に残量計82で計測されている充電電力量Uと例えば上記規定値 U_s との差に相当する容量不足になったとの判断の下に、インバータ77の動作が停止し、放電が終了する。

【0072】この補充放電制御については、一例を記述したに過ぎず、これに限定されることはない。

【0073】なお、電気二重層コンデンサCの充電電力

量（残量）の測定は二次電池と比較すると簡単であり、静電容量 C_0 と端子電圧 V_t を用いた下式（残量計測算定式）により、充電電力量 U を求めることができる。

$$U = (1/2) \cdot C_0 \cdot V^2$$

このことから、残量計82としては単に端子電圧Vの計測機能を持つだけで十分であり、これを保護制御部78から端末19に送り、その端末19で上式の演算を実行することにより求め得る。残量計82の計測結果（端子電圧V）を保護制御部78および端末19を介して電気事業者30のサーバ31に送り、そのサーバ31で上式の演算を実行することにより求めることもできる。

【0074】一方、電気事業者のサーバ31は、主要な機能として次の(1)～(8)の手段を備える。

(1) 各計測器82の計測結果に基づき、所定の電力供給該当日における各需要家20の電力需要を推定する推定手段、すなわち、サーバ31は、各需要家20の端末23に定期的にデータ要求を指示することにより、各需要家20の端末23から各計測器82の計測データ（電力・電力量・力率）を需要家20ごとに固有のIDと共に収集し、かつ必要に応じて計測データおよび現地気象データをを用い、これら収集した計測データおよび現地気象データを用い、さらに上記IDに基づいて当該サーバ31の内部メモリから読み出される需要家基礎データ（需要家ごとに固有）などを用いた所定の演算により、現時点より先の所定の時期における各需要家20の電力需要つまり使用電力および使用電力量を推定する。その時期の使用電力および使用電力量を推定する場合は、予め設定されている単位計測時間の次回分について行う場合と、その次回分とそれ以降に続く複数回の単位計測時間について行う場合があり、そのいずれでもよい。

【0075】(2) 推定された電力需要に相当する電力を、上記電力供給該当日において、各電気事業者10から送電網1に送出させるための発電計画を決定する決定手段、すなわち、各電気事業者10から通告される事前発電計画、各電気事業者10の現地気象データなどに基つき、発電計画を決定する。この発電計画は、電力供給該当日における予め設定されている単位計測時間ごとに必要電力を対応付けたものである。

【0076】(3) 決定された発電計画を各電気事業者10の端末14に通信ネットワーク2を介して通知する通知手段。

【0077】(4) 各計測器13の計測結果に基づき、各電気事業者10から送電網1への電力供給状況を検出する検出手段。すなわち、サーバ31は、各電気事業者10の端末14に定期的にデータ要求を指示することにより、各電気事業者10の端末14から各計測器13の計測データ（電力・電力量・力率）を電気事業者10ごとに固有のIDと共に収集し、この収集した計測データ

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から電力供給状況を検出する。

【0078】(5) 上記電力供給該当日の当日、発電計画に基づき電力供給が実行されている状況において、各計測器13の計測により検出される電力供給状況と各計測器82の計測により検出される電力使用状況との対比に基づいて、かつ各電気事業者10に固有の発電事業者基礎データおよび各電気事業者10の現地気象データなどに基づいて、現時点より先の電力供給と電力使用との繰越バランスを予測（監視）し、その予測結果に応じて各電気事業者10の供給電力に対する増減を決定する予測手段（監視手段）。

【0079】この場合、予め設定されている単位計測時間の次回分について、またはその次回分とそれに続く複数回の単位計測時間について、予測が行われる。

【0080】(6) 上記設定された増減電圧を増加指令・削減指令として各電気事業者10の端末14に通信ネットワーク2を介して送る指令手段。

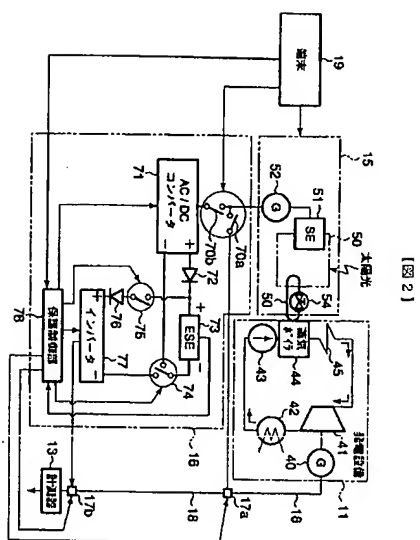
【0081】(7) 各電気事業者10の端末19との通信ネットワーク2によるデータ送受信により、その端末19および保護制御部78を介して残量計82の計測結果を監視する監視手段。

【0082】(8) 上記増加指令の送出後、上記検出される電力供給状況、上記指示された増減電圧を含む所定値またはその所定値を基準とする制御許容範囲から外れていて、そのめり方向が不足側、つまり送電網1への電力供給が必要で20の電力使用に對し不足している場合、その不足分が少くても電力エネルギー貯蔵システム16を放電させてその放電電力を送電網1に送出し、不足分が少くても電力エネルギー貯蔵システム15を送電網1に送出し、そのスクウェアンジン発電システム15からの送電にもめり不足が解消されなければそのスクウェアンジン発電システム15の発電と送電を続けながら電力エネルギー貯蔵システム16を放電させる制御手段。

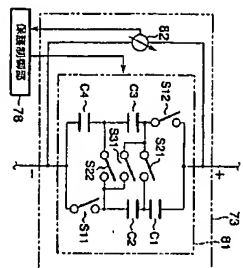
【0083】なお、発電事業者10の端末14には、発電事業者10に固有の識別情報であるID、発電機40の種類・基礎データグラフィカル、発電機40の特性モニタリンググラフィカル、発電機40の制御・管理メニューグラフィカル、発電計画グラフィカル、過去の発電データグラフィカル、気象データグラフィカルなどがあらかじめ登録され、かつ、電気事業者30のサーバ31や気象情報取得など必要なセンサと通信機能が搭載されている。

【0084】端末19には、電力エネルギー貯蔵システム16における蓄電ユニット73の基本特性データグラフィカル、蓄電ユニット73の特性モニタリンググラフィカル、蓄電ユニット73の周辺回路に関する制御・管理メニューグラフィカルなどがあらかじめ登録されるとともに、サーバ31との通信機能が搭載されている。

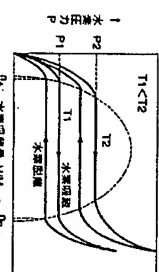
【0085】電気事業者30のサーバ31には、各電気



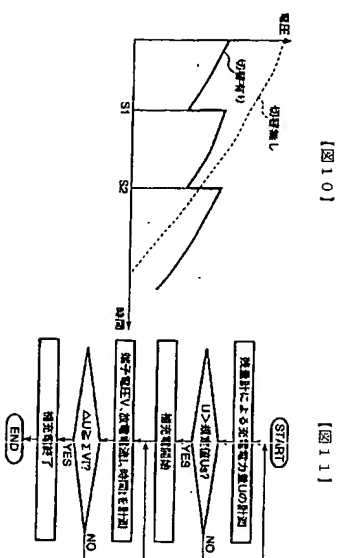
【図2】



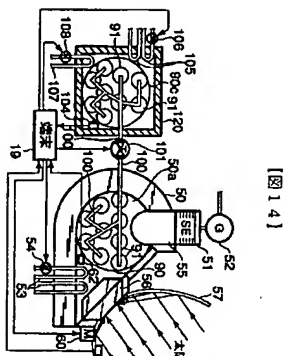
【96】



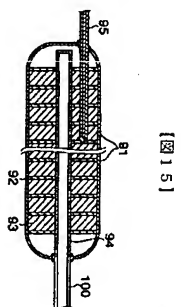
【図 16】



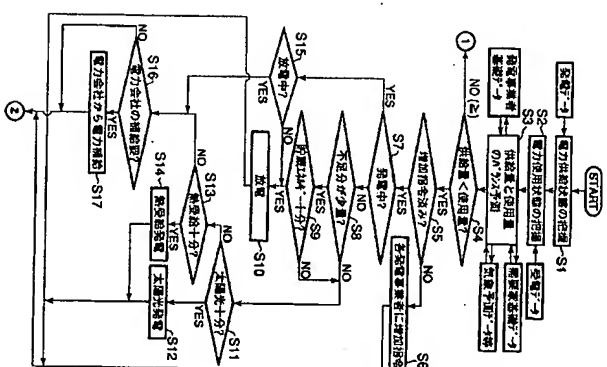
【010】



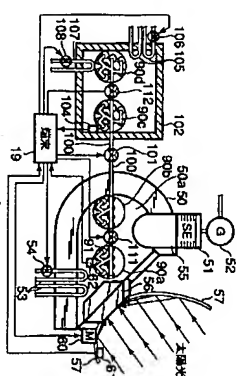
【图 14】



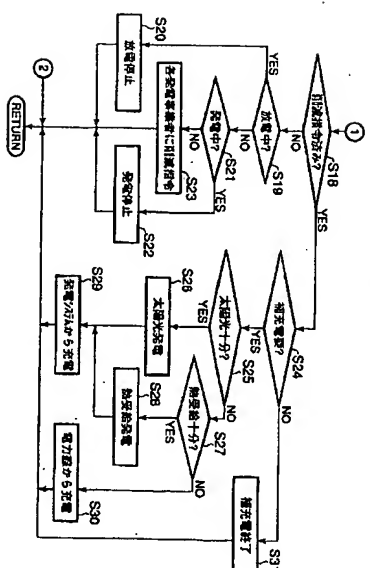
【图 15】



【図 12】



【図 17】



【例 13】

(19)

特開2002-345149

フロントページの続き

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エネット内

Fターム(参考) 5G066 MA02 MA04 MA20

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CLAIMS

[Claim(s)]

[Claim 1] The dump power managerial system characterized by providing the auxiliary generation-of-electrical-energy means in which power transmission to said transmission network is possible, and the control means which controls operation of said auxiliary generation-of-electrical-energy means according to the demand and supply balance of the electric power supply to said transmission network, and a power activity of said power user in the dump power managerial system which an electric power utility purchases a power producer's dump power, and supplies the purchased power to a power user directly from said power producer with a transmission network.

[Claim 2] Said control means is a dump power managerial system characterized by having a means to make said auxiliary generation-of-electrical-energy means operate when the electric power supply to said transmission network becomes insufficient to said power user's power activity in a dump power managerial system according to claim 1.

[Claim 3] In a dump power managerial system according to claim 1 said auxiliary generation-of-electrical-energy means Said control means established in said power producer's facilities The 1st terminal which is established in said power producer's facilities and controls said auxiliary generation-of-electrical-energy means, The server in which data transmission and reception with the 2nd

terminal established in said power user's facilities and these 1st and 2nd terminals are possible, A means to be formed in this server and to supervise the demand and supply balance of the electric power supply to said transmission network, and a power activity of said power user by data transmission and reception with said each terminal, The dump power managerial system characterized by what it has a means for it to be prepared in said server and to send the control command according to said monitor result to said 1st terminal for.

[Claim 4] In the dump power managerial system which an electric power utility purchases a power producer's dump power, and supplies the purchased power to a power user directly from said power producer with a transmission network The energy storage means in which the discharge to said transmission network is [enabling charge of the generation-of-electrical-energy output of the auxiliary generation-of-electrical-energy means in which power transmission to said transmission network is possible, and said auxiliary generation-of-electrical-energy means, or charge of said dump power] possible, The dump power managerial system characterized by providing the control means which controls operation of said auxiliary generation-of-electrical-energy means, and the charge and discharge of said energy storage means according to the demand and supply balance of the electric power supply to said transmission network, and a power activity of said power user.

[Claim 5] Said control means is a dump power managerial system characterized by having a means to make operation or said energy storage means said auxiliary generation-of-electrical-energy means discharge when the electric power supply to said transmission network becomes insufficient to said power user's power activity in a dump power managerial system according to claim 4, and a means to make said energy storage means charge by part for the excess when the electric power supply to said transmission network becomes superfluous to said power user's power activity.

[Claim 6] In a dump power managerial system according to claim 4 said auxiliary

generation-of-electrical-energy means and said energy storage means Said control means established in said power producer's facilities The 1st terminal which is established in said power producer's facilities and controls said auxiliary generation-of-electrical-energy means and said energy storage means, The server in which data transmission and reception with the 2nd terminal established in said power user's facilities and these 1st and 2nd terminals are possible, A means to be formed in this server and to supervise the demand and supply balance of the electric power supply to said transmission network, and a power activity of said power user by data transmission and reception with said each terminal, The dump power managerial system characterized by what it has a means for it to be prepared in said server and to send the control command according to said monitor result to said 1st terminal for.

[Claim 7] It is the dump power managerial system characterized by having the Stirling engine driven with the heat energy extracted in the extraction unit with which said auxiliary generation-of-electrical-energy means extracts heat energy from sunlight or an external heat source in a dump power managerial system according to claim 1 to 6, and this extraction unit, and the generator generated under the power of this Stirling engine.

[Claim 8] It is the dump power managerial system characterized by said external heat source being the generating heat of a generation-of-electrical-energy facility of said power producer in a dump power managerial system according to claim 7.

[Claim 9] It is the dump power managerial system characterized by having the converter by which said energy storage means carries out conversion into dc of the input power in a dump power managerial system according to claim 4 to 6, the accumulation-of-electricity unit connected to the outgoing end of this converter, and the inverter which carries out conversion into ac of the electrical potential difference of this accumulation-of-electricity unit, and sending out the output of this inverter to said transmission network.

[Claim 10] It is the dump power managerial system characterized by said accumulation-of-electricity unit having a rechargeable battery in a dump power

managerial system according to claim 9.

[Claim 11] It is the dump power managerial system characterized by said accumulation-of-electricity unit having an electric double layer capacitor in a dump power managerial system according to claim 9.

[Claim 12] It is the dump power managerial system characterized by having a change means by which said accumulation-of-electricity unit changes the pattern of interconnect of each of that electric double layer capacitor to serial in a dump power managerial system according to claim 9 with the electrical-potential-difference change at the time of discharge of two or more electric double layer capacitors and these electric double layer capacitors.

[Claim 13] In the dump power managerial system which an electric power utility purchases a power producer's dump power, and supplies the purchased power to a power user directly from said power producer with a transmission network It is prepared in the auxiliary generation-of-electrical-energy means in which power transmission to said transmission network is possible, and said auxiliary generation-of-electrical-energy means. The energy storage means in which storage and bleedoff of energy required for a generation of electrical energy of the auxiliary generation-of-electrical-energy means are possible, The dump power managerial system characterized by providing the control means which controls operation of said auxiliary generation-of-electrical-energy means, and storage and bleedoff of said energy storage means according to the demand and supply balance of the electric power supply to said transmission network, and a power activity of said power user.

[Claim 14] In a dump power managerial system according to claim 13 said auxiliary generation-of-electrical-energy means The extraction unit which extracts heat energy from sunlight or an external heat source, The Stirling engine driven with the heat energy extracted in this extraction unit, Said energy storage means to have the generator generated under the power of this Stirling engine The 1st hydrogen storing metal alloy tank by which it was prepared in said extraction unit, and the hydrogen storing metal alloy was held, The thermostat which it is

prepared out of said extraction unit, and can incorporate heat energy from the exterior, The dump power managerial system characterized by having the hydrogen duct connected between the 2nd hydrogen storing metal alloy tank by which it was prepared in this thermostat and the hydrogen storing metal alloy was held, and said 1st hydrogen storing metal alloy tank and said 2nd hydrogen storing metal alloy tank, and the closing motion valve prepared in this hydrogen duct.

[Claim 15] In the dump power managerial system which an electric power utility purchases a power producer's dump power, and supplies the purchased power to a power user directly from said power producer with a transmission network A 1st detection means to detect the power supplied to said transmission network, and a 2nd detection means to detect the power incorporated by said power user from said transmission network, A presumed means to presume said power user's power requirements based on the detection result of said 2nd detection means, A decision means to opt for the generation-of-electrical-energy plan for sending out the power equivalent to said presumed power requirements to said transmission network from said power producer, It is based on comparison with an advice means to notify said power producer of said generation-of-electrical-energy plan for which it opted, and the detection result of said 1st detection means and the detection result of said 2nd detection means. A prediction means to predict the demand and supply balance of a previous electric power supply and a power activity from this time, and to set up the increase and decrease of a value to said power producer's supply voltage according to the prediction result, A command means to order said power producer said set-up increase and decrease of a value, and the auxiliary generation-of-electrical-energy means, in which power transmission to said transmission network is possible, The energy storage means in which the discharge to said transmission network is [enabling charge of the output of said auxiliary generation-of-electrical-energy means, or charge of said dump power] possible, When the electric power supply by detection of said 1st detection means has separated after said command from a

predetermined value including said ordered increase and decrease of a value, or the control tolerance on the basis of the predetermined value, The dump power managerial system characterized by providing the control means which makes said energy storage means charge by part for the excess when operation or said energy storage means will be made to discharge and the direction of a blank will become an excess side about said auxiliary generation-of-electrical-energy means, if the direction of a blank is a lack side.

[Claim 16] It is the dump power managerial system characterized by said presumed means presuming power requirements in a dump power managerial system according to claim 15 based on the basic data of a proper, this power user's local meteorological data, etc. to said power user.

[Claim 17] It is the dump power managerial system characterized by presuming about degree batch of the unit measurement time amount to which said presumed means is beforehand set in the dump power managerial system according to claim 15, or the unit measurement time amount of the multiple times following the degree batch and it.

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DETAILED DESCRIPTION

[Detailed Description of the Invention]

[0001]

[Field of the Invention] An electric power utility purchases a power producer's dump power, and this invention relates to the dump power managerial system which supplies the purchased power to a power user directly from a power producer using the transmission network of an electric power company and which is applied to the so-called retail-power-sales business.

[0002]

[Description of the Prior Art] In recent years, activity of an activity centering on production and negotiations, such as a negotiation on the global magnitude of an information industry, fertilization of the life article in connection with this, amplification of a negotiation, manufacture of various electronic equipment, spread and activity of business, the advancement of a transportation system, quantitative amplification, and food, is becoming remarkable especially with development of human society. In connection with it, diversification of power and an energy activity gestalt and large buildup of the amount used have taken place.

[0003] On the other hand, in the current energy system centering on a fossil fuel, we talk about an exhaustion of the residual reserves of a fossil fuel, and come to be anxious about contamination of the earth by exhaust gas and trash, and the environmental protection in earth magnitude and a deployment of energy came to be cried for.

[0004] It does not wait for argument that diversification of the activity gestalt of the energy centering on the power accompanying development and buildup of the amount used are predicted to be what will be continued by human society, and the environmental protection in earth magnitude and a deployment of energy also serve as a technical problem more important naturally still.

[0005] In order to be in such a situation, to attain various offers of the energy supply system of a gestalt corresponding to diversification of the activity gestalt of energy, such as power and gas, and reduction-ization of an energy activity price and to build more advanced and satisfying energy supply organization,

regulation of energy industries, such as power and gas, was eased and liberalization was attached to the start.

[0006] To liberalization of the power industry, it is the object which gives a power user (the following, consumer) supply of not only the conventional public-power-supply-industry company (henceforth an electric power company) but power, and a new entrepreneur (henceforth an electric power utility), i.e., a specific magnitude electric power utility, will undertake a power sale business.

[0007]

[Problem(s) to be Solved by the Invention] However, hold many varieties, such as a nuclear power plant, a thermal power station, and a hydroelectric power station, and large-scale electric power plants, and change of each consumer's operating electric energy is received. Unlike an electric power company without the need of adjusting the amount of generations of electrical energy minutely one by one, the electric power plant of the limited quantity is held. Or in the case of the electric power utility of only receiving an electric power supply from an agreement power producer, without holding an electric power plant The power or electric energy which a consumer needs is presumed, and in order to supply the power or electric energy corresponding to this to a consumer from self electric power plant or agreement power producer, the adjustment must be carried out at any time.

[0008] Because, if superfluous power or electric energy is generated in order to secure a consumer's presumed need power or presumed need electric energy, enterprise continuation will become difficult, without the ability taking about [deserting the technical problem of the worldwide magnitude of a deployment of energy], and profit.

[0009] But in the organization which supplies last-minute power or electric energy to a consumer's presumed need power or presumed need electric energy, if the unexpected situation produces lifting of unexpected atmospheric temperature, concentration of an unexpected interest about change or amusement of a weather condition called lowering, etc., a consumer's need electric energy may

increase and the lack of the amount of supply may be caused.

[0010] In this case, since the power which an electric power company owns is also flowing though natural to that transmission network if the electric power supply from a power producer to a consumer is in the situation performed by borrowing the entrusted transmission network of an electric power company, although the power or electric energy of a part used as the lack of the amount of supply serves as a form automatically provided from an electric power company and a consumer is not troubled, the compensation of a large sum will be required of an electric power utility from an electric power company. When it becomes like this, for an electric power utility, there is a possibility that enterprise continuation may become difficult, without the ability taking profit.

[0011] Therefore, for an electric power utility, the generator which fulfills the grand total of the need [that it may be expected] power or need electric energy of each consumer who contracted is owned itself, or it is contracting with a power producer and securing need power or need electric energy, and it is necessary to build the supply organization with which are satisfied a demand of a consumer.

[0012] Conventionally, as for the electric power supply to a consumer, the power producer to whom the part was limited is carrying this out monopolistically by legal restrictions. Although these power producers build and own the electric power plant of a large number which realize generated output and generated energy of the magnitude far exceeding it to the power and electric energy which the consumer who contracted uses, the actual condition is not having the technique which corresponds to a consumer's power used and operating electric energy finely.

[0013] This invention is a thing in consideration of the above-mentioned situation, and the place made into that object is to offer the dump power managerial system excellent in the dependability which an electric power utility can secure certainly from a power producer the power or electric energy which a power user needs, and can supply it adequately to a power user.

[0014]

[Means for Solving the Problem] An electric power utility purchases a power producer's dump power, and the dump power managerial system of invention concerning claim 1 supplies the purchased power to a power user directly from said power producer with a transmission network, and is equipped with the auxiliary generation-of-electrical-energy means in which power transmission to a transmission network is possible, and the control means which controls operation of the above-mentioned auxiliary generation-of-electrical-energy means according to the demand and supply balance of the electric power supply to a transmission network, and a power activity of a power user.

[0015] The dump power managerial system of invention concerning claim 2 is limited about the control means in invention concerning claim 1. The control means has a means to make an auxiliary generation-of-electrical-energy means operate, when the electric power supply to a transmission network becomes insufficient to a power user's power activity.

[0016] The dump power managerial system of invention concerning claim 3 is limited about the auxiliary generation-of-electrical-energy means and the control means in invention concerning claim 1. The auxiliary generation-of-electrical-energy means is established in a power producer's facilities. The 1st terminal which a control means is established in a power producer's facilities, and controls the above-mentioned auxiliary generation-of-electrical-energy means, The server in which data transmission and reception with the 2nd terminal established in a power user's facilities and these 1st and 2nd terminals are possible, It has a means to be formed in this server and to supervise the demand and supply balance of the electric power supply to a transmission network, and a power activity of a power user by data transmission and reception with each above-mentioned terminal, and a means for it to be prepared in the above-mentioned server and to send the control command according to the above-mentioned monitor result to the 1st terminal of the above.

[0017] The dump power managerial system of invention concerning claim 4 It is what an electric power utility purchases a power producer's dump power, and

supplies the purchased power to a power user directly from said power producer with a transmission network. The auxiliary generation-of-electrical-energy means in which power transmission to a transmission network is possible, The energy storage means in which the discharge to a transmission network is [enabling charge of the generation-of-electrical-energy output of this auxiliary generation-of-electrical-energy means, or charge of the above-mentioned dump power] possible, It has the control means which controls operation of the above-mentioned auxiliary generation-of-electrical-energy means, and the charge and discharge of the above-mentioned energy storage means according to the demand and supply balance of the electric power supply to a transmission network, and a power activity of a power user.

[0018] The dump power managerial system of invention concerning claim 5 is limited about the control means in invention concerning claim 4. The control means has a means to make operation or the above-mentioned energy storage means the above-mentioned auxiliary generation-of-electrical-energy means discharge when the electric power supply to a transmission network becomes insufficient to a power user's power activity, and a means to make the above-mentioned energy storage means charge by part for the excess when the electric power supply to a transmission network becomes superfluous to a power user's power activity.

[0019] The dump power managerial system of invention concerning claim 6 is limited in invention concerning claim 4 about the auxiliary generation-of-electrical-energy means, the energy storage means, and the control means. The auxiliary generation-of-electrical-energy means and the energy storage means are established in a power producer's facilities. The 1st terminal which a control means is established in a power producer's facilities, and controls the above-mentioned auxiliary generation-of-electrical-energy means and the above-mentioned energy storage means, The server in which data transmission and reception with the 2nd terminal established in a power user's facilities and these 1st and 2nd terminals are possible, It has a means to be formed in this server

and to supervise the demand and supply balance of the electric power supply to a transmission network, and a power activity of a power user by data transmission and reception with each above-mentioned terminal, and a means for it to be prepared in the above-mentioned server and to send the control command according to the above-mentioned monitor result to the 1st terminal of the above.

[0020] The dump power managerial system of invention concerning claim 7 is limited about the auxiliary generation-of-electrical-energy means in invention concerning either claim 1 thru/or claim 6. The auxiliary generation-of-electrical-energy means has the extraction unit which extracts heat energy from sunlight or an external heat source, the Stirling engine driven with the heat energy extracted in this extraction unit, and the generator generated under the power of this Stirling engine.

[0021] invention which the dump power managerial system of invention concerning claim 8 requires for claim 7 -- setting -- external **** -- it is ***** (ing) just. An external heat source is the generating heat of a generation-of-electrical-energy facility of a power producer.

[0022] The dump power managerial system of invention concerning claim 9 is limited about the energy storage means in invention concerning either claim 4 thru/or claim 6. An energy storage means has the converter which carries out conversion into dc of the input power, the accumulation-of-electricity unit connected to the outgoing end of this converter, and the inverter which carries out conversion into ac of the electrical potential difference of this accumulation-of-electricity unit, and sends out the output of this inverter to said transmission network.

[0023] The dump power managerial system of invention concerning claim 10 is limited about the accumulation-of-electricity unit in invention concerning claim 9. The accumulation-of-electricity unit has the rechargeable battery.

[0024] The dump power managerial system of invention concerning claim 11 is limited about the accumulation-of-electricity unit in invention concerning claim 9.

The accumulation-of-electricity unit has the electric double layer capacitor.

[0025] The dump power managerial system of invention concerning claim 12 is limited about the accumulation-of-electricity unit in invention concerning claim 9.

The accumulation-of-electricity unit has two or more electric double layer capacitors and the change means which changes the pattern of interconnect of each of that electric double layer capacitor to serial with the electrical-potential-difference change at the time of discharge of these electric double layer capacitors.

[0026] The dump power managerial system of invention concerning claim 13 It is what an electric power utility purchases a power producer's dump power, and supplies the purchased power to a power user directly from said power producer with a transmission network. The auxiliary generation-of-electrical-energy means in which power transmission to a transmission network is possible, It is prepared in this auxiliary generation-of-electrical-energy means. The energy storage means in which storage and bleedoff of energy required for a generation of electrical energy of that auxiliary generation-of-electrical-energy means are possible, It has the control means which controls operation of the above-mentioned auxiliary generation-of-electrical-energy means, and storage and bleedoff of the above-mentioned energy storage means according to the demand and supply balance of the electric power supply to a transmission network, and a power activity of a power user.

[0027] The dump power managerial system of invention concerning claim 14 is limited in invention concerning claim 13 about the auxiliary generation-of-electrical-energy means and the energy storage means. The auxiliary generation-of-electrical-energy means has the extraction unit which extracts heat energy from sunlight or an external heat source, the Stirling engine driven with the heat energy extracted in this extraction unit, and the generator generated under the power of this Stirling engine. An energy-storage means has the hydrogen duct connected between the 1st hydrogen-storing-metal-alloy tank by which it was prepared in the above-mentioned extraction unit, and the hydrogen

storing metal alloy was held, the thermostat which it is prepared out of the above-mentioned extraction unit, and can incorporate heat energy from the exterior, the 2nd hydrogen-storing-metal-alloy tank by which it was prepared in this thermostat and the hydrogen storing metal alloy was held, and the above-mentioned 1st hydrogen-storing-metal-alloy tank and the above-mentioned 2nd hydrogen-storing-metal-alloy tank, and the closing-motion valve which were prepared in this hydrogen duct.

[0028] The dump power managerial system of invention concerning claim 15 A 1st detection means to detect the power which an electric power utility purchases a power producer's dump power, supplies the purchased power to a power user directly from said power producer with a transmission network, and is supplied to a transmission network, A 2nd detection means to detect the power incorporated by the power user from a transmission network, A presumed means to presume a power user's power requirements based on the detection result of this 2nd detection means, A decision means to opt for the generation-of-electrical-energy plan for sending out the power equivalent to these presumed power requirements to a transmission network from a power producer, It is based on comparison with an advice means to notify a power producer of this generation-of-electrical-energy plan for which it opted, and the detection result of the above-mentioned 1st detection means and the detection result of the above-mentioned 2nd detection means. A prediction means to predict the demand and supply balance of a previous electric power supply and a power activity from this time, and to set up the increase and decrease of a value to a power producer's supply voltage according to the prediction result, A command means to order a power producer this set-up increase and decrease of a value, and the auxiliary generation-of-electrical-energy means, in which power transmission to a transmission network is possible, The energy storage means in which the discharge to a transmission network is [enabling charge of the output of this auxiliary generation-of-electrical-energy means, or charge of the above-mentioned dump power] possible, When the electric power supply by detection of the above-mentioned 1st detection

means has separated after the above-mentioned command from a predetermined value including the increase and decrease of a value by which the command was carried out [above-mentioned], or the control tolerance on the basis of the predetermined value, If the direction of a blank is a lack side, when operation or the above-mentioned energy storage means will be made to discharge and the direction of a blank will become an excess side about the above-mentioned auxiliary generation-of-electrical-energy means, it has the control means which makes the above-mentioned energy storage means charge by part for the excess.

[0029] The dump power managerial system of invention concerning claim 16 is limited about the presumed means in invention concerning claim 15. A presumed means presumes power requirements based on the basic data of a proper, this power user's local meteorological data, etc. to a power user.

[0030] The dump power managerial system of invention concerning claim 17 is limited about the presumed means in invention concerning claim 15. A presumed means presumes about degree batch of the unit measurement time amount set up beforehand, or the unit measurement time amount of the multiple times following the degree batch and it.

[0031]

[Embodiment of the Invention] [1] Explain the 1st operation gestalt of this invention with reference to a drawing hereafter. In drawing 1 , 10 is the power producer who contracted with the electric power utility, and owns the terminal (the 1st terminal) 14 of the measuring instrument (the 1st detection means) 13 which detects for example, measures the value and electric energy of power which are supplied to the below-mentioned transmission network 1, the computer connected to this measuring instrument 13 from the control unit 12 for controlling the generation-of-electrical-energy facility 11 and this generation-of-electrical-energy facility 11, and the generation-of-electrical-energy facility 11. A measuring instrument 13 measures the power-factor other than the value of power, and electric energy.

[0032] such a power producer 10 -- the generated output of those with two or more, and each generation-of-electrical-energy facility 11 -- the so-called dump power of the part exceeding the power used for original operation of a power producer 10 is supplied to the electric power company transmission network 1 inside in the form purchased by the specific magnitude electric power utility (it is hereafter called an electric power utility for short) 30. This transmission network 1 is a facility which electric power company where an electric power utility 30 is another owns. When an electric power utility 30 entrusts power transmission to the electric power company which owns this transmission network 1, the dump power which the electric power utility 30 purchased from each power producer 10 is directly supplied to two or more power users (a consumer is called hereafter) 20 from each power producer 10 through a transmission network 1.

[0033] Each consumer 20 owns the terminal (the 2nd terminal) 23 of the measuring instrument (the 2nd detection means) 22 which detects for example, measures the value and electric energy of the building 21 which incorporates power from a transmission network 1 and is used for operation of an internal load system, and the power incorporated in this building 21, the computer connected to this measuring instrument 22. A measuring instrument 22 measures the power-factor other than the value of power, and electric energy.

[0034] An electric power utility 30 exchanges with each power producer 10 agreements which purchase each power producer's 10 dump power, and exchanges agreements which sell the purchased power to each consumer 20 with each consumer 20, and exchanges agreements of power transmission bailment among the owners of a transmission network 1 as mentioned above, performs the management from the purchase of dump power to supply, and is equipped with the server 31 as a control device. The data transmission and reception which minded the communication networks 2, such as the Internet, between each power producer's 10 terminal 14 and each consumer's 20 terminal 23 are possible for a server 31. Moreover, although not illustrated, the data transmission and reception which minded the communication network 2 also to

the terminal of the electric power company which has entrusted power transmission are possible for a server 31.

[0035] In addition, in each power producer 10, signal-line connection of the control device 12 is made at a terminal 14, and you may make it send the transmitting content from a server 31 to a terminal 14 to a control device 12 as it is as data for generator control to the generation-of-electrical-energy facility 11.

[0036] In such a configuration, the Stirling-engine generation-of-electrical-energy system 15 which is an auxiliary generation-of-electrical-energy means, the power energy storage system 16 which is an energy storage means, and the terminal 19 are established in one or more power producers' 10 facilities.

[0037] The Stirling-engine generation-of-electrical-energy system 15 can transmit the power which connected with the power line 18 between the generation-of-electrical-energy facility 11 and a measuring instrument 13, and was generated by operation to a transmission network 1.

[0038] The power energy storage system 16 has an accumulation-of-electricity unit, it charges a part for the excess with which a consumer's 20 activity is not presented among the dump power supplied to the power line 18, charges a part for the excess of the generated output of the power energy storage system 16, or has the function which discharges the conserved power to a transmission network 1 further if needed.

[0039] The data transmission and reception through the above-mentioned communication network 2 are possible for a terminal 19 between the above-mentioned servers 31, and it constitutes the control means which controls operation of the Stirling-engine generation-of-electrical-energy system 15 and the charge and discharge of the power energy storage system 16 with the server 31.

[0040] The configuration of the Stirling-engine generation-of-electrical-energy system 15, the power energy storage system 16, and its periphery is shown in drawing 2 .

[0041] The generation-of-electrical-energy facility 11 is the so-called steam-power-generation facility, and is equipped with a generator 40, the steam turbine

41 which drives this generator, the condenser 42 which condenses the steam which passed through this steam turbine 41, the conveying pump 43 which sends the water obtained with this condenser 42 to a steam boiler 44, and the superheater 45 which overheats the steam generated with a steam boiler 44. The dump power exceeding the power used for original operation among the generated output of a generator 40 of a part is sent out to a transmission network 1 through the power line 18 and a measuring instrument 13.

[0042] The Stirling-engine generation-of-electrical-energy system 15 is equipped with the heat carrier tubing 53 which leads the extraction unit 50 which extracts the heat energy for driving Stirling engine 51, the generator 52 generated under the power of this Stirling engine 51, and Stirling engine 51 from sunlight or an external heat source, and an external heat source, for example, the generating heat of a steam boiler 44, to the extraction unit 50 by circulation of a heat carrier, the closing-motion valve 54 for flow control prepared in this heat carrier tubing 53, and operation is controlled by the terminal 19. open/close switch 70a following the command of a terminal 19 in the output terminal (output terminal of a generator 52) of this Stirling-engine generation-of-electrical-energy system 15, and electromagnetism -- while connecting with the power line 18 through breaker 17a, similarly it connects with the input terminal of the power energy storage system 16 through open/close switch 70b following the command of a terminal 19.

[0043] The example of this Stirling-engine generation-of-electrical-energy system 15 is shown in drawing 3 . While the extraction unit 50 is equipped with the inside space of the body formed with the heat insulator as condensing section 50a, makes some above-mentioned heat carrier tubing 53 and the point of a heat pipe 55 face the condensing section 50a and equips the end face section of the heat pipe 55 with Stirling engine 51, it equips opening for condensing of condensing section 50a with a condenser lens 56 and the condensing plate 57, and he is trying to collect sunlight. That is, that sunlight is brought together in condensing section 50a, or when the closing motion valve 54 is opened and the heat of a

steam boiler 44 radiates heat to condensing section 50a through the heat carrier tubing 53, the internal temperature of condensing section 50a rises, and when the heat energy gets across to Stirling engine 51 with a heat pipe 55, Stirling engine 51 operates. A generator 52 drives with this power. Accommodation of an elevation angle is possible for the condensing plate 57, and the motor 60 is formed in the include-angle accommodation. Moreover, the photosensor 61 which detects the quantity of light of sunlight is formed inside the condensing plate 57. Furthermore, the temperature sensor 62 is formed in condensing section 50a.

[0044] On the other hand, the power energy storage system 16 One contact of the diode 72 for antisuckbacks and the bidirection switch 74 is minded [AC / DC converter 71 which carries out conversion into dc of the input power (alternating current power), and / this / 71]. The contact of another side of an open/close switch 75, the diode 76 for antisuckbacks, and the bidirection switch 74 is accumulation-of-electricity minded [the connected accumulation-of-electricity unit 73 and / this / 73]. While controlling actuation of the inverter 77 which is connected and carries out conversion into ac of the electrical potential difference of the accumulation-of-electricity unit 73, these converters 71, the bidirection switch 74, and an open/close switch 75 according to the command from a terminal 19 It has the protection control section 78 which supervises the condition of the accumulation-of-electricity unit 73, and sends the monitor data to a terminal 19. the output terminal (output terminal of an inverter 77) of this power energy storage system 16 -- electromagnetism -- it connects with the power line 18 through breaker 17b.

[0045] The accumulation-of-electricity unit 73 is equipped with two or more rechargeable batteries (cel) B1, B-2, and the group cell 80 that consists of --Bn as shown in drawing 4 . A rechargeable battery B1, B-2, --Bn are the lead cell [the efficient and lowering rate of the amount of energy which could carry out long duration storage comparatively and was moreover stored with time is small in power energy, and] which can moreover emit stored energy for a short time as

much as possible, a nickel-cadmium battery, a nickel hydride battery (nickel/MH cell), a lithium ion battery (Li ion cell), etc. These cells are extensively sold as product in commercial scene, and according to fertilization price reduction is achieved, the charge controlling method is also established, the technique of reinforcement or a countermeasure to heat is also progressing further, comparatively high dependability can be expected, and lead-wire connection of the ends is made at the protection control section 78 as an object for a condition judging (for the judgment of object for degradation judging, and charge electric energy), respectively. Although carried out by the comparison operation of detection data and basic data about the judgment of charge electric energy, this comparison operation may be performed by the protection control section 78, or may be performed by the server 31 side of an electric power utility 30, or those any are sufficient as it.

[0046] In addition, it is desirable that set up the capacity of the each second cell, size, and the number according to conditions of supply (an electrical potential difference, conditions of a current), and wire and carry out the modularization of these rechargeable batteries to the optimal serial parallel, and only a required number connects and constitutes these modules in a proper serial parallel. About this configuration, a battery life is grasped and it determines in consideration of the capacity at the time of a life. A battery life will apply preferably the cell which becomes ten years or more still more preferably for several years or more. It becomes [a changing battery becomes it frequent that a life is less than several years, and / the cost which an exchange cell and exchange take] high and is not desirable.

[0047] When installation area seldom receives constraint and it thinks cost reduction as important, adoption of a lead cell is the most effective. There is no big constraint in installation area, and it is cost serious consideration, it is used comparatively frequently, and when heavy loading is required, a nickel-cadmium battery is the most effective. Although installation area receives constraint to some extent, uses it comparatively frequently and is heavy loading, when there is

no constraint in respect of cost not much, a nickel hydride battery is the most effective. When installation area is restrained greatly and there is no constraint in respect of cost in reverse not much, a lithium ion battery is the most effective.

[0048] Moreover, about each of a rechargeable battery B1, B-2, --Bn, if required and required for a voltage sensor, a current sensor, the sensor of temperature, and a pan, the distortion sensor of a cell case etc. will be formed and safety and dependability will be managed. Even if it performs this management, carrying out a data sampling at the protection control section 78 or a terminal 19, it may be performed to the same power producer's 10 terminal 14, or the server 31 of an electric power utility 30 by carrying out data transmission.

[0049] In such a power energy storage system 16, the supplementary current to the accumulation-of-electricity unit 73 is carried out by the protection control section 78. Processing of this supplementary current is shown in drawing 5 .

[0050] The charge electric energy U of the accumulation-of-electricity unit 73 is measured by the protection control section 78, if the charge electric energy U becomes under the default value U_s that decreases by self-discharge or activity and is defined beforehand, the Stirling-engine generation-of-electrical-energy system 15 will drive, and the generated output of the Stirling-engine generation-of-electrical-energy system 15 will be incorporated by the power energy storage system 16 by ON of open/close switch 70b. In the power energy storage system 16, conversion into dc of the output of the Stirling-engine generation-of-electrical-energy system 15 is carried out by the converter 71, and it is impressed to the accumulation-of-electricity unit 73 by ON of one contact of the bidirection switch 74. In this way, the supplementary current of the accumulation-of-electricity unit 73 is carried out. In addition, when generated by the amount of [with which the dump power on the power line 18 is not presented by a consumer's 20 activity] excess, it is also possible to incorporate the power on the power line 18 to the power energy storage system 16 by ON of open/close switches 70a and 70b, and to carry out the supplementary current of the accumulation-of-electricity unit 73, without driving the Stirling-engine generation-of-electrical-energy system 15.

[0051] During the supplementary current, monitoring of the electrical potential difference V , the charging current I , and the charging time t of the accumulation-of-electricity unit 73 is carried out by the protection control section 78, and if the purport which Charge U attained with the full charge U_e is judged by the protection control section 78, the above-mentioned supplementary current will be ended.

[0052] Generally, the residue judging of the accumulation-of-electricity unit 73 carries out a comparison operation to the property data of the electrical potential difference in the last charging time value, a current, a charging time value, and the rechargeable battery beforehand inputted from environmental temperature when required, calculates discharge quantity of electricity, and calculates the residue of the charge electric energy of a rechargeable battery. In charge, similarly, a comparison operation is carried out to the property data of change of an electrical potential difference, a current value, time amount, and the rechargeable battery that carried out monitoring of the environmental temperature when required, and was inputted beforehand similarly, and a full charge is judged. In addition, according to the class of rechargeable battery, if required, it will be directed that control of a charge termination electrical potential difference and the charging current, time control, and a temperature rise limitation are set as the protection control section 78, and a terminal 19 performs required charge control.

[0053] When discharge is needed, an open/close switch 75 is turned on, and the contact of another side of the bidirection switch 74 is turned on, and an inverter 71 drives further. thereby, the electrical potential difference of the accumulation-of-electricity unit 73 carries out conversion into ac with an inverter 77 -- having -- it -- electromagnetism -- the power line 18 is supplied by ON of breaker 17b.

[0054] By the way, as an accumulation-of-electricity unit 73, the adoption of an electric double layer capacitor other than a rechargeable battery can be considered. This example is shown in drawing 6 .

[0055] 81 is the capacitor bank which has two or more electric double layer

capacitor C, and constitutes the pattern electronic switch from each electric double layer capacitor C and two or more open/close switch S. By adoption of this pattern electronic switch, the so-called bank switching which changes the pattern of interconnect of each of that electric double layer capacitor C to serial by each open/close switch S with the electrical-potential-difference change at the time of discharge of each electric double layer capacitor C is made possible. Namely, as for electric double layer capacitor C, unlike a rechargeable battery, an electrical potential difference falls linearly with a charging time value. Therefore, it is good to use effectively charge quantity of electricity of each electrical machinery double layer capacitor C, suppressing as small as possible lowering of the electrical potential difference by progress of a charging time value.

[0056] At the time of initiation of discharge, circuit changing switches S11 and S12 turn on first, and the connection pattern of 2 serials and 2 juxtaposition as shown in drawing 7 is formed. If discharge progresses and an electrical potential difference falls to the 1st predetermined value, circuit changing switches S11 and S12 will turn off, switches S21 and S22 will be turned on instead, and the connection pattern which combined juxtaposition as shown in drawing 8 $R > 8$, and a serial will be formed. further -- discharge -- then, if an electrical potential difference falls to the 2nd predetermined value (the 1st < predetermined value), circuit changing switches S21 and S22 will turn off, a circuit changing switch S31 will turn on, and as shown in drawing 9 $R > 9$, a serial connection pattern will be formed altogether. Discharge voltage is equalized as much as possible by such bank switching, and the amount of effective power is secured by it.

[0057] Drawing 10 compares and shows change of discharge voltage in case there is nothing with the case where bank switching occurs. If bank switching is carried out, on the occasion of ON of a circuit changing switch, and an off change, an electrical potential difference will be recovered in the lifting direction, and the surface smoothness of an electrical potential difference will be improved compared with the case where bank switching is not carried out, and a charging time value will also become long.

[0058] 1V set and an organic electrolytic-solution system also combine two or more series connections and parallel connection of electric double layer capacitor C from being 3V at most by the aqueous electrolysis liquid system, and he is trying for the capacity for one piece of electric double layer capacitor C to, secure a sufficient electrical potential difference and electric energy in short.

[0059] Electric double layer capacitor C applied to this system holds the function to conserve the power generated by the Stirling-engine generation-of-electrical-energy system 15, or the power generated by the generation-of-electrical-energy facility 11 over beyond a fixed period and more than a constant rate, and the function which discharges fixed quantity of electricity within fixed time amount at the time of the power need. For this reason, 100 or more W/kg and an energy density are adopted for output density, and electric double layer capacitor C below 100ohmF is adopted for 5 Wh/kg and internal resistance.

[0060] Output density becomes huge [the plottage which supply-voltage adjustment for which an electric power utility 30 asks by kg in less than 100W /temporarily is not realized to unit load-dispatch-instruction time amount (less than 30 minutes is common), but quantity of electricity from which an energy density is stored in a capacitor by kg in less than 5Whs /is insufficient, and causes lack to the adjustment power which an electric power utility 30 finds, and installs a capacitor for earning adjustment power], and neither is desirable. If internal resistance exceeds 100ohmF, discharge power from electric double layer capacitor C cannot follow in footsteps of adjustment power of the power for every unit time amount for which an electric power utility 30 asks, but the meaning which installed the electric double layer capacitor will be lost, and this is not desirable, either.

[0061] Moreover, the polarizable electrode ingredient and electrolytic-solution ingredient which constitute electric double layer capacitor C Although there will be no limit in any way if the requirements mentioned above are fulfilled, unit price activation of the organic compound fiber textile fabrics, such as a phenol system, is carried out to an electrode material as an example. Granular carbon powder,

electric conduction agents, such as carbon black, and Teflon (trademark) emulsions (or Teflon (trademark) powder), such as an ingredient which gave aluminium spraying to one side as a charge collector, and activated carbon which carried out activation, are kneaded and sheet-ized. On one side Aluminium foil, Or CO₂ gas heating of the organic compound gels, such as an ingredient, formaldehyde resorcinol, etc. which stuck the plate, is carried out. It macromolecule-izes the sol-gel method heat-treated under nitrogen-gas-atmosphere mind, and an organic compound low-molecular. The ingredient which sheet-ized similarly using the firing carbon created by the heat-treated polymerization method, and stuck the charge collector, Conductive polymer sheet materials, such as a thin layer sheet material and the poly acene, etc. are mentioned in metallic oxides, such as a platinum system alloy, ruthenium oxide, and indium oxide.

[0062] The acid made to dissolve compounds, such as alkali metal and alkaline earth metal, in an electrolytic-solution ingredient, Or tetrabutylammonium tetrafluoroborate besides an alkali water solution etc., tetra-alkylammonium ion (R, R', and R'' -- 'and R'''-N⁺ ion --) R, R', and R -- ", R''' -- an alkyl group -- being shown -- tetra-alkyl ammonium salt with anions, such as PF₆⁻ and BF₄⁻, -- a solute -- carrying out -- propylene carbonate PC -- The non-aqueous-solvent electrolytic solution dissolved in mixed stock organic solvents, such as independent organic solvents, such as gamma butyrolactone gamma-BL, or PC/ethylene carbonate (PC/EC), and PC/sulfolane (PC/SL), is mentioned.

[0063] Between the polarizable electrodes of the couple chosen from these ingredients, a separator is inserted and paper, polyethylene, polypropylene, and the porous sheet and glass fiber sheet of Teflon (trademark) are mentioned as an ingredient of a separator.

[0064] Electric double layer capacitor C makes these electrodes the laminating which sandwiched the separator and the collecting electrode plate in between, contains them in a container, and can consider the laminating type which fills up with and obturates the electrolytic solution, and the cylinder type which involves

in inter-electrode by one through a separator, contains this in a cylindrical container, and fills up with and obturates the electrolytic solution.

[0065] However, if the conditions which these show an example which constitutes electric double layer capacitor C, are a request, and were mentioned above are fulfilled, it will not be limited to this at all.

[0066] Moreover, the electric energy stored in electric double layer capacitor C decreases with time by self-discharge. Although a self-discharge rate changes with the configuration of electric double layer capacitor C, configurations, environmental temperature, etc., it is about set to 30% / month, and is in a larger inclination than the self-discharge of the one to the twice and the rechargeable battery of 5 or so times of a lead cell (3 - 5% / month), and Li ion cell (5% / month extent), a nickel-cadmium battery (10 - 20% / month), and a nickel hydride battery (15 - 30% / month). Therefore, it is necessary to carry out a supplementary current suitably.

[0067] On the other hand, in order to carry out reliable power control in addition to the policy of a deployment of the power by the above-mentioned bank switching, the charge electric energy (residue) currently stored in the capacitor bank 81 is measured with residue 82 [a total of], and the charge-and-discharge control according to the measurement result is applied.

[0068] An example of this supplementary current is shown in the flow chart of drawing 11 . first, the charge electric energy U currently stored in the capacitor bank 81 measures with residue 82 [a total of] -- having -- **** -- the charge electric energy U -- oneself -- if it becomes under the default value U_s (80% of the electric energy at the time of a full charge) that decreases by discharge or activity and is defined beforehand, the Stirling-engine generation-of-electrical-energy system 15 will drive, and the generated output of the Stirling-engine generation-of-electrical-energy system 15 will be incorporated by the power energy storage system 16 by ON of open/close switch 70b. In the power energy storage system 16, conversion into dc of the output of the Stirling-engine generation-of-electrical-energy system 15 is carried out by the converter 71, and

it is impressed to the accumulation-of-electricity unit 73 by ON of one contact of the bidirection switch 74. In this way, the supplementary current of the capacitor bank 81 is carried out. In addition, when generated by the amount of [with which the dump power on the power line 18 is not presented by a consumer's 20 activity] excess, it is also possible to incorporate the power on the power line 18 to the power energy storage system 16 by ON of open/close switches 70a and 70b, and to carry out the supplementary current of the capacitor bank 81, without driving the Stirling-engine generation-of-electrical-energy system 15.

[0069] During a supplementary current, the terminal voltage V of the capacitor bank 81 and the charging current to the capacitor bank 81 are detected by the protection control section 78. When the product of the terminal voltage V and charging current I is called for, the product is added with time amount progress and the aggregate value reaches charge need electric-energy ΔU equivalent to the difference of the charge electric energy U and full charge electric energy by which measurement was carried out [above-mentioned], Under decision, a supplementary current is ended for if the capacitor bank 81 became a full charge.

[0070] When discharge is needed, an open/close switch 75 is turned on, and the contact of another side of the bidirection switch 74 is turned on, and an inverter 71 drives further. thereby, the electrical potential difference of the capacitor bank 81 carries out conversion into ac with an inverter 77 -- having -- it -- electromagnetism -- the power line 18 is supplied by ON of breaker 17b.

[0071] On the occasion of this discharge, the terminal voltage V of the capacitor bank 81 and the discharge current from the capacitor bank 81 are detected by the protection control section 78. The discharge electric energy with the charge electric energy U which discharge electric energy is calculated from the product of the terminal voltage V , discharge current, and time amount, and is measured with residue 82 [a total of] at the time of discharge starting For example, when the discharge permissible electric energy equivalent to a difference with the above-mentioned default value U_s is reached, Under decision, actuation of an inverter 77 is suspended for if the capacitor bank 81 became the lack of capacity,

and discharge is completed.

[0072] About this supplement controlling the discharge, it does not pass to have described an example and is not limited to this.

[0073] In addition, measurement of the charge electric energy (residue) of electric double layer capacitor C is easy as compared with a rechargeable battery, and the charge electric energy U can be calculated by the bottom type (residue measurement calculation formula) which used electrostatic capacity Co and terminal voltage V.

It comes out from this enough only by having the measurement function of terminal voltage V as residue 82 [a total of], and is. $U = (1/2) \text{ and } Co \cdot V^2$ -- May ask for this by performing the operation of a top type from the protection control section 78 at delivery and its terminal 19 to a terminal 19, and The measurement result (terminal voltage V) of residue 82 [a total of] can also be searched for by performing the operation of a top type by delivery and its server 31 to the server 31 of an electric power utility 30 through the protection control section 78 and a terminal 19.

[0074] On the other hand, the server 31 of an electric power utility is equipped with the means of following (1) - (8) as main functions.

(1) A presumed means to presume each consumer's 20 power requirements in a predetermined electric power supply relevance day based on the measurement result of each measuring instrument 22. A server 31 namely, by directing a data demand to each consumer's 20 terminal 23 periodically The measurement data (power, electric energy, and power-factor) of each instrumentation 22 are collected with ID of a proper every consumer 20 from each consumer's 20 terminal 23. And the measurement data and the local meteorological data which collected and these-collected local meteorological datas are used from each terminal 23 if needed. By the predetermined operation using the consumer basic data (it is a proper for every consumer) by which reading appearance is furthermore carried out from the internal memory of the server 31 concerned based on Above ID, each consumer's 20 power requirements, i.e., power used,

and operating electric energy in a previous predetermined stage are presumed from this time. Of which stage the power used and operating electric energy are presumed may carry out about the case where it carries out about degree batch of the unit measurement time amount set up beforehand, and the unit measurement time amount of the multiple times following the degree batch and it, and the any are sufficient as it.

[0075] (2) A decision means to opt for the generation-of-electrical-energy plan for sending out the power equivalent to the presumed power requirements to a transmission network 1 from each power producer 10 in the above-mentioned electric power supply relevance day. That is, based on the power producer basic data of a proper, each power producer's 10 local meteorological data, etc., a generation-of-electrical-energy plan is determined as the prior generation-of-electrical-energy plan and each power producer 10 who are announced by each power producer 10. This generation-of-electrical-energy plan matches need power for every unit measurement time amount in an electric power supply relevance day set up beforehand.

[0076] (3) An advice means to notify the generation-of-electrical-energy plan for which it opted through a communication network 2 to each power producer's 10 terminal 14.

[0077] (4) A detection means to detect the electric power supply situation from each power producer 10 to a transmission network 1 based on the measurement result of each measuring instrument 13. That is, by directing a data demand to each power producer's 10 terminal 14 periodically, a server 31 collects the measurement data (power, electric energy, and power-factor) of each instrumentation 13 with ID of a proper every power producer 10 from each power producer's 10 terminal 14, and detects an electric power supply situation from these collected measurement data.

[0078] (5) In the situation that the electric power supply based on a generation-of-electrical-energy plan is performed actually on the day of the above-mentioned electric power supply relevance day It is based on comparison with the electric

power supply situation detected by measurement of each measuring instrument 13, and the power operating condition detected by measurement of each measuring instrument 22. And it is based on each power producer 10 at the power producer basic data of a proper, each power producer's 10 local meteorological data, etc. A prediction means to predict demand and supply balance of a previous electric power supply and a power activity from this time (monitor), and to set up the increase and decrease of a value to each power producer's 10 supply voltage according to the prediction result (monitor means).

[0079] In this case, prediction is performed about degree batch of the unit measurement time amount set up beforehand, or the unit measurement time amount of the multiple times following that degree batch and it.

[0080] (6) The command means sent to each power producer's 10 terminal 14 through a communication network 2 by considering the increase and decrease of a value by which setting out was carried out [above-mentioned] as increment command / cutback command.

[0081] (7) A monitor means to supervise the measurement result of residue 82 [a total of] through the terminal 19 and the protection control section 78 by the data transmission and reception by the communication network 2 with each power producer's 10 terminal 19.

[0082] (8) It has separated from the predetermined value in which the above-mentioned electric power supply situation by which detection is carried out includes the increase and decrease of a value by which the command was carried out [above-mentioned] after sending out of the above-mentioned increment command, or the control tolerance on the basis of the predetermined value. The direction's of blank lack side, i.e., when the electric power supplies to a transmission network 1 run short to a consumer's 20 power activity, If the insufficiency is little, will make the power energy storage system 16 discharge, and the discharge power will be sent out to a transmission network 1. If an insufficiency is not little, will operate the Stirling-engine generation-of-electrical-energy system 15, and the generated output will be sent out to a transmission

network 1. The control means which makes the power energy storage system 16 discharge, continuing a generation of electrical energy and power transmission of the Stirling-engine generation-of-electrical-energy system 15 if lack is not canceled in spite of the power transmission from the Stirling-engine generation-of-electrical-energy system 15.

[0083] In addition, ID which is the identification information of a proper, the class and basic data file of a generator 40, the property monitoring file of a generator 40, control and the management menu file of a generator 40, a generation-of-electrical-energy planned file, the past generation-of-electrical-energy data file, a weather data file, etc. are beforehand registered into a power producer by a power producer's 10 terminal 14, and communication facility with a required pin center, large, such as the server 31 of an electric power utility 30 and weather intelligence acquisition, is carried in it.

[0084] While the basic property data file of the accumulation-of-electricity unit 73 in the power energy storage system 16, the property monitoring file of the accumulation-of-electricity unit 73, control, a management menu file about the circumference circuit of the accumulation-of-electricity unit 73, etc. are registered beforehand, communication facility with a server 31 is carried in the terminal 19.

[0085] ID which is the identification information of a proper in the server 31 of an electric power utility 30 at each power producer 10 and each consumer 20, The basic data file of each generator 40, the generation-of-electrical-energy data file of each generator 40, Each consumer's 20 basic data file, the power receiving data file of each consumer's 20 past, A generation-of-electrical-energy planned file, a generation-of-electrical-energy / activity power-related monitoring file, demand-and-supply-balance control / management file, A load-dispatch-instruction directions file, a supply-and-demand control file with the electric power company which owns a transmission network 1, A weather data file, electric double layer capacitor control / management directions file, The past data file of an electric double layer capacitor etc. is registered beforehand, and communication facility with required pin center, large, such as each terminals 14

and 23, a management pin center, large of an electric power company, and other weather intelligence management pin center, large, is carried.

[0086] Monitoring menu files which are the identification information of a proper, such as a power activity data file, power receiving power, electric energy, etc. of ID, and the basic data file and the past of a consumer 20, are beforehand registered into a consumer 20 by each consumer's 20 terminal 23, and communication facility with a server 31 is carried in it.

[0087] Below, an operation of the above-mentioned configuration is explained, referring to the flow chart of drawing 12. A server 31 receives power receiving data, such as power used and operating electric energy, from each consumer's 20 terminal 23, and grasps a power busy condition while it receives generation-of-electrical-energy data, such as a supply voltage and the amount of supply voltages, from each power producer's 10 terminals 14 and 19 and grasps an electric power supply condition (and generation-of-electrical-energy situation) (step S1) (step S2). On top of that, in a server 31, if required for a power producer's 10 basic data, a consumer's 20 basic data, and this, a comparison operation will be carried out to required-information data, such as meteorological data, such as atmospheric temperature and the weather, and the demand and supply balance of the amount of supply and the amount used will be predicted (step S3).

[0088] When the amount of presumption used in the next unit measurement time amount or two or more future unit measurement time amount exceeds the plan amount of supply (YES of step S4), it is ordered from a server 31 in the increment in required power to each power producer's 10 terminal 14 (YES of step S5, step S6).

[0089] After this increment command, when the plan amount of supply does not catch up with the amount of presumption used yet, (YES of step S4, YES of step S5), and the Stirling-engine generation-of-electrical-energy system 15 are un-operating (NO of step S7), and moreover, if the insufficiency is little (YES of step S8), the energy-emitting from the power energy storage system 16 will be

considered. That is, the stored energy (charge electric energy of the accumulation-of-electricity unit 73) of the power energy storage system 16 comes out enough, and on condition that a certain thing, (YES of step S9) and the power energy storage system 16 discharge (step S10). This discharge power is supplied to a transmission network 1, and the insufficiency of power is filled up. [0090] However, if an insufficiency is not little (NO of step S8), or when the stored energy (charge electric energy of the accumulation-of-electricity unit 73) of the power energy storage system 16 is not enough, (NO of step S9) and operation of the Stirling-engine generation-of-electrical-energy system 15 will be planned. That is, it is judged whether sunlight light-receiving and heat receipt of the extraction unit 50 in the Stirling-engine generation-of-electrical-energy system 15 are enough for operation respectively (step S11, step S13). The light income of sunlight is detected with a photosensor 61. A motor 60 drives and the elevation angle of the condensing inverter 57 is adjusted so that this detection quantity of light may serve as max. The amount of heat receipt is detected with a temperature sensor 62.

[0091] With [the detection quantity of light of a photosensor 61 is beyond the set point, and / the detection temperature of the temperature sensor 62 in condensing section 50a] the set point [beyond] moreover, (YES of step S11) and operation of Stirling engine 51 by sunlight energy are started under judgment that sunlight light-receiving is enough (step S12: photovoltaics). And this generated output is supplied to a transmission network 1.

[0092] For bad weather or night, when sunlight light-receiving is imperfection, (NO of step S11) and the closing motion valve 54 are opened, the heat carrier in the heat carrier tubing 53 circulates, and the generating heat of a steam boiler 44 is emitted to condensing section 50a. If the detection temperature of the temperature sensor 62 in condensing section 50a becomes by this heat dissipation beyond the set point, operation of Stirling engine 51 by the heat energy generated from (YES of step S13) and a steam boiler 44 under judgment that heat receipt is enough will be started (step S14: heat receipt generation of

electrical energy). And this generated output is supplied to a transmission network 1.

[0093] In this way, after the generating operation of the Stirling-engine generation-of-electrical-energy system 15 is started, when the plan amount of supply does not catch up with the amount of presumption used yet, (YES of step S4, YES of step S5, YES of step S7), and discharge of the power energy storage system 16 are started (NO of step S15, step S10). And this discharge power is supplied to a transmission network 1.

[0094] In spite of the generating operation of the Stirling-engine generation-of-electrical-energy system 15, and discharge of the power energy storage system 16 When [worst] the plan amount of supply does not catch up with the amount of presumption used yet (it YES(s) step S4) YES of step S5, YES of step S7, YES of step S15, It is reported in (YES of step S16), and the management pin center, large of the electric power company where that has jurisdiction [area / where each consumer 20 exists] to the bottom of decision that the power from an electric power company needs to be supplied (step S17).

[0095] In addition, the generating heat of a steam boiler 44 is insufficient, or when a heat receipt generation of electrical energy of the Stirling-engine generation-of-electrical-energy system 15 is impossible, (YES of step S16) and that are reported by the reasons of exerting trouble on a generation of electrical energy of the generation-of-electrical-energy facility 11 in the management pin center, large of an electric power company like the above to the bottom of decision that the power from an electric power company needs to be supplied (step S17).

[0096] Then, if the plan amount of supply will be in the condition of exceeding the amount of presumption used (NO of step S4), when each power producer's 10 terminal 14 is not ordered yet in the power cutback from a server 31, first of all, discharge of the power energy storage system 16 and the generating operation of the Stirling-engine generation-of-electrical-energy system 15 will be suspended, respectively (steps S19, S20, S21, and S22). (NO of step S18) The

plan amount of supply still exceeds the amount of presumption used also for this, and when the amount of excess is 5% or more of the amount of presumption used, each power producer's 10 terminal 14 is ordered [if / a part of amount of supply voltages becomes useless and profitability falls] in a power cutback from a server 31 under decision (step S23).

[0097] After this cutback command, if the plan amount of supply is more than the amount of presumption used (NO of step S4, YES of step S18), it will be estimated by the inquiry to a terminal 19 from a server 31 whether the amount of energy storage of the power energy storage system 16 (charge electric energy of the accumulation-of-electricity unit 73) is enough. When the amount of energy storage of the power energy storage system 16 is not enough, (YES of step S24) and the possibility of actuation of the Stirling-engine generation-of-electrical-energy system 15 are examined under decision that the supplementary current of the accumulation-of-electricity unit 73 is required. That is, it is judged whether sunlight light-receiving and heat receipt of the extraction unit 50 in the Stirling-engine generation-of-electrical-energy system 15 are enough respectively (step S25, step S27).

[0098] With [the detection quantity of light of a photosensor 61 is beyond the set point, and / the detection temperature of the temperature sensor 62 in condensing section 50a] the set point [beyond] moreover, (YES of step S25) and operation of Stirling engine 51 by sunlight energy are started under judgment that sunlight light-receiving is enough (step S26: photovoltaics). And the supplementary current of the accumulation-of-electricity unit 73 is carried out by this generated output.

[0099] For bad weather or night, when sunlight light-receiving is imperfection, (NO of step S25) and the closing motion valve 54 are opened, the heat carrier in the heat carrier tubing 53 circulates, and the generating heat of a steam boiler 44 is emitted to condensing section 50a. If the detection temperature of the temperature sensor 62 in condensing section 50a becomes by this heat dissipation beyond the set point, operation of Stirling engine 51 by (YES of step

S27) and the generating heat energy of a steam boiler 44 will be started under judgment that heat receipt is enough (step S14: heat receipt generation of electrical energy). And the supplementary current of the accumulation-of-electricity unit 73 is carried out by this generated output.

[0100] However, the generating heat of a steam boiler 44 is insufficient, or a part for the excess with which each consumer's 20 activity is not presented among the dump power currently supplied to the power line 18 from the generator 40 of the generation-of-electrical-energy facility 11 when a heat receipt generation of electrical energy of the Stirling-engine generation-of-electrical-energy system 15 is impossible is incorporated by the power energy storage system 16 by the reasons of having an adverse effect on operation of the generation-of-electrical-energy facility 11, and the supplementary current of the accumulation-of-electricity unit 73 is carried out (step S30).

[0101] If the supplementary current of the accumulation-of-electricity unit 73 is completed (NO of step S24), operation of the Stirling-engine generation-of-electrical-energy system 15 will be suspended, or the power incorporation from the power line 18 will be stopped, and a supplementary current will be ended (step S31).

[0102] By repeating such processing for every unit measurement time amount, the demand and supply balance of power can be held with a high level, and, therefore, reliable dump power management can be realized.

[0103] By purchasing dump power from a power producer 10, and adopting this system, when performing the electric industry which sells this power to a consumer 20, the proper electric power supply organization suitable for the situation of the power used and operating electric energy of a consumer 20 can be established, and a very big contribution can be achieved in the viewpoint of high reliance of electric-industry management, and a revenue guarantee.

[0104] That is, an electric power utility 30 can secure certainly from a power producer 10 the power or electric energy which a consumer 20 needs, a consumer 20 can be supplied adequately, and it becomes the thing excellent in

dependability.

[0105] [2] Explain the 2nd operation gestalt. With the 2nd operation gestalt, a power energy storage means by which the hydrogen storing metal alloy was used is built into the Stirling-engine generation-of-electrical-energy system 15. The power energy storage system 16 is removed in connection with this.

[0106] A hydrogen storing metal alloy has the property to carry out occlusion of the hydrogen and to secede from it with temperature, a pressure, and hydrogen concentration. The reaction between a hydrogen storing metal alloy and hydrogen H_2 is expressed with a bottom type. In addition, ΔE is the energy accompanying occlusion desorption of hydrogen. $2/nM + H_2 \rightleftharpoons 2/nMH_n + \Delta E$ -- storage of power energy and bleedoff are performed using endoergic [at the time of carrying out occlusion of the hydrogen of this hydrogen storing metal alloy], and the exothermic reaction at the time of ****ing.

[0107] That is, as shown in drawing 14 , hydrogen storing metal alloy tank (1st hydrogen storing metal alloy tank) 90a is prepared in condensing section 50a of the extraction unit 50, and two or more hydrogen storing metal alloy hold machines (the 1st hydrogen storing metal alloy hold machine) 91 are formed in the hydrogen storing metal alloy tank 90a. The hydrogen storing metal alloy (particle) is held in these hydrogen storing metal alloy hold machine 91, respectively. Moreover, the hydrogen duct 100 is opened for free passage by these hydrogen storing metal alloy hold machine 91, the hydrogen duct 100 is drawn out of the extraction unit 50, and the edge is introduced into the thermostat 102. The closing motion valve 101 for flow control is formed in the hydrogen duct 100.

[0108] Hydrogen storing metal alloy tank (2nd hydrogen storing metal alloy tank) 90c is prepared in a thermostat 102, two or more hydrogen storing metal alloy hold machines (the 2nd hydrogen storing metal alloy hold machine) 91 are formed in the hydrogen storing metal alloy tank 90c, and the introductory edge of the above-mentioned hydrogen duct 100 is opened for free passage by each of that hydrogen storing metal alloy hold machine 91. The hydrogen storing metal

alloy (particle) is held also in these hydrogen storing metal alloy hold machine 91, respectively. Moreover, while the heat carrier tubing 105 through which the generating heat of an external heat source, for example, the exoergic part of the generation-of-electrical-energy facility 11, circulates through a heat carrier is introduced, the cooling water tubing 107 through which an external heat source, for example, the cooling water from the generation-of-electrical-energy facility 11, circulates is introduced into the thermostat 102. The closing motion valve 106,107 for flow control is formed in these heat carrier tubing 105 and the cooling water tubing 107, and lifting and descent of the temperature in a thermostat 102 are possible respectively by the proper closing motion.

[0109] A temperature sensor 62,104 is attached in the hydrogen storing metal alloy tanks 90a and 90c, respectively, and these temperature sensors 62,104 and the above-mentioned closing motion valve 101,106,108 are connected to the terminal 19.

[0110] The hydrogen by which occlusion is carried out to each hydrogen storing metal alloy hold machine 91 of hydrogen storing metal alloy tank 90a goes up in response to the heat energy of sunlight more than constant temperature, and is desorbed from each hydrogen storing metal alloy hold machine 91. The hydrogen from which it was desorbed moves to hydrogen storing metal alloy tank 90c of a thermostat 102 through the hydrogen duct 100 by disconnection of the closing motion valve 101. a terminal 19 -- closing motion of the closing motion valve 108 of the cooling water tubing 107, and the closing motion valve 106 of the heat carrier tubing 105 -- respectively -- proper -- adjusting -- beforehand -- constant temperature -- the temperature in a layer 102 is set below to the temperature which can carry out hydrogen absorption of each hydrogen storing metal alloy hold machine 91 in hydrogen storing metal alloy tank 90c, and occlusion of the hydrogen by which desorption migration was carried out from hydrogen storing metal alloy tank 90of condensing section 50a a is carried out to each hydrogen storing metal alloy hold machine 91 in hydrogen storing metal alloy tank 90c. Since it will be accompanied by generation of heat if occlusion of

the hydrogen is carried out to each hydrogen storing metal alloy hold machine 91, the closing motion valve 106,108 is adjusted until temperature and a pressure are stabilized, in order to maintain container internal pressure below at a safety standard, holding hydrogen absorption, finally the closing motion valve 101 is closed, and energy is stored. The midst which was made to drive Stirling engine 51 and has been generated with the generator 52 is also possible for storage of this energy.

[0111] Thus, the stored energy is emitted if needed suitably. namely, constant temperature -- it is made to go up to the value in which the hydrogen in which occlusion was carried out to the hydrogen storing metal alloy in each hydrogen storing metal alloy hold machine 91 in hydrogen storing metal alloy tank 90c by accommodation of the closing motion valve 106,108 can be desorbed from the temperature of hydrogen storing metal alloy tank 90c of a layer 102 It is made to move to hydrogen storing metal alloy tank 90of condensing section 50a through the hydrogen duct 100 by disconnection of the closing motion valve 101, and occlusion of the hydrogen from which this is desorbed is carried out to each hydrogen storing metal alloy hold machine 91. With the heat energy generated in connection with the occlusion at this time, make Stirling engine 55 drive, a generator 52 is made to drive, and it generates electricity.

[0112] Although and occlusion and desorption of the hydrogen to each hydrogen storing metal alloy hold machine 91 in hydrogen storing metal alloy tank 90a and 90c are performed by driving a motor 60 and adjusting closing motion of the closing motion valve 106,108, carrying out monitoring of the temperature with the temperature sensor 62,104 attached in these tank walls, the actuation is carried out while a terminal 19 repeats data collection. [changing the include angle of the condensing plate 57] If required, it will control by the server 31, communicating by the terminal 19 and the server 31.

[0113] The cross-section configuration of the hydrogen storing metal alloy hold machine 91 is shown in drawing 15 . The hydrogen storing metal alloy hold machine 91 puts the hydrogen storing metal alloy particle 93 in each tooth space

divided with two or more metal plates 92, and the head of the hydrogen duct 100 connects the porous tubing 94 which consists of a porous ceramic, and hydrogen penetrates the porous tubing 94 and contacts the hydrogen storing metal alloy particle 93. Moreover, a temperature sensor 95 is also inserted in the hydrogen storing metal alloy hold machine 91, and it enables it to control occlusion hydrogen or the amount of hydrogen desorption by temperature in it.

[0114] As for the hydrogen storing metal alloy ingredient held in the hydrogen storing metal alloy hold machine 91, it is desirable to have the following properties.

(1) Activation is easy. (2) A hydrogen storage capacity is large. (3) **** capacity is large. (4) It has the heat of formation suitable for **** temperature conditions. (5) The range of the equilibrium of the pressure which can hold hydrogen absorption, temperature, and hydrogen concentration is wide (the so-called plateau field of a PCT curve is large, and the inclination is small). (6) The hysteresis (the difference of the pressure of occlusion and the pressure of desorption, i.e., irreversibility) of balanced hydrogen pressure is small. (7) The occlusion and the amount of desorption of hydrogen are large. (8) It is reversible enough at **** and heat dissipation temperature. (9) It has good thermal conductivity. (10) The pulverization of an alloy is excellent in endurance few. (11) It is cheap.

[0115] As a hydrogen storing metal alloy ingredient which may fulfill these conditions A titanium system alloy, a rare earth system alloy, a zirconium system alloy, calcium alloys, Alloys, such as a magnesium system alloy, are applicable. As a concrete alloy ingredient Mg_2Ni , $MmNi_5$, $MmNi_5-xAl_x$, $MmNi_5-xFe_x$, $LmNi_5$, $TiFe$, $TiFe_{1-x}Mn_x$, $Ti_{1-x}Zr_xCr_{1-y}Mn_{1+y}$, $FeTi_{1.13-1.19}Fe_{0.7}Ti_{10}O_3$, $FeTi_{1-x}O_y$, $It\ xAl_x(es)$, $CaNi_5$, $Ca_xNi_yMm_zAl_w$, and $CaNi_5-LaNi_5$, $LaNi_5$, and $LaNi_5-Zr_{1-x}Ti_x$, $Zr_{0.5}Ti_{0.5}(Mn_{0.8}Fe_{0.2})_{1.7}$, $Zr_{0.8}Ti_{0.2}(Fe_{0.75}V_{0.15}Cr_{0.1})_2$, $Ti_{1.2}Zr_{0.2}Cr_{1.2}Mn_{0.8}$, $Ti_{1.2}Cr_{1.2}Mn_{0.8}$, $Ti_{1.2}CrMn$, $TiFe_{1-x-y}Ni_xV_y$, $Ti_{1.1}Fe_{0.8}Ni_{0.2}Zr_{0.05}$, $TiCo_{0.5}Fe_{0.5}V_{0.05}$, etc. can be chosen. In addition, Mm is a misch metal (mixture of a rare earth metal), and Lm is a lanthanum

consolidation misch metal. Moreover, a front face will be covered with a metal oxide film or a carbon material if it is the mixed stock ingredient of these alloys, and the need. Moreover, if required, even if it will use the alloy of the same presentation, using the powder mixture of a different particle size, endoergic and calorific value can be controlled or a hydrogen storage capacity can be changed. However, it is not necessarily limited to these that what is necessary is just the alloy ingredient which has the function in which the content of this invention is realized.

[0116] In actual employment, sunlight appears from a hydrogen storing metal alloy in desorption of occlusion hydrogen enough. In a certain case Adjust the include angle of the condensing plate 57, bring sunlight together in condensing section 50a, and the temperature in condensing section 50a is raised. Hydrogen is desorbed from the hydrogen storing metal alloy of each hydrogen storing metal alloy hold machine 91 in hydrogen storing metal alloy tank 90a in condensing section 50a. Disconnection of the closing motion valve 101 conveys the hydrogen from which it was desorbed through the hydrogen duct 100 to hydrogen storing metal alloy tank 90c in a thermostat 102, occlusion of it is carried out to the hydrogen storing metal alloy of each hydrogen storing metal alloy hold machine 91, and the energy of the amount of conventions is stored (supplementary current by photovoltaics).

[0117] When [weak] sunlight is not desorbed from the hydrogen by which occlusion is carried out to the hydrogen storing metal alloy of each hydrogen storing metal alloy hold machine 91 of hydrogen storing metal alloy tank 90a in condensing section 50a, the generating heat utilization of the generation-of-electrical-energy facility 11 examines the possibility of the hydrogen desorption in hydrogen storing metal alloy tank 90c of a thermostat 102. If there is no trouble in a generation of electrical energy of the generation-of-electrical-energy facility 11 and it judges that the power requirements to each consumer 20 are enough even if it receives heat from the generation-of-electrical-energy facility 11 Convey heat energy for the closing motion valve 54 of the heat carrier tubing 53 to aperture

and condensing section 50a, and the temperature of hydrogen storing metal alloy tank 90a in condensing section 50a is raised. The hydrogen by which occlusion was carried out to the hydrogen storing metal alloy of each hydrogen storing metal alloy hold machine 91 in the hydrogen storing metal alloy tank 90a is desorbed. Disconnection of the closing motion valve 101 conveys it to hydrogen storing metal alloy tank 90c in a thermostat 102 through the hydrogen duct 100. Occlusion is carried out to the hydrogen storing metal alloy of each hydrogen storing metal alloy hold machine 91 in the hydrogen storing metal alloy tank 90c, and the energy of the amount of conventions is stored (supplementary current by heat-receiving generation of electrical energy).

[0118] Although operation of the Stirling-engine generation-of-electrical-energy system 15 is needed when the electric power supplies to each consumer 20 run short On condition that sufficient heat energy to be desorbed from the hydrogen by which occlusion was carried out to the hydrogen storing metal alloy in hydrogen storing metal alloy tank 90c of a thermostat 102 if extraction of the heat energy only in the extraction unit 50 is inadequate is obtained from the exoergic part of the generation-of-electrical-energy facility 11 The closing motion valve 106 by the side of a thermostat 102 is opened, heat transport is performed to a thermostat 102, and the hydrogen storing metal alloy of each hydrogen storing metal alloy hold machine 91 is raised more than constant temperature. And the closing motion valve 101 is opened, it flows through the hydrogen duct 100, and occlusion of the hydrogen from which it is desorbed in the hydrogen storing metal alloy tank 90c side is carried out to the hydrogen storing metal alloy of each hydrogen storing metal alloy hold machine 91 in hydrogen storing metal alloy tank 90a in condensing section 50a. The temperature in condensing section 50a is raised by generation of heat by this occlusion, with that heat energy, Stirling engine 51 is driven, a generator 52 is operated under that power, and that generated output is supplied to a transmission network 1. Since it is almost the same as the 1st operation gestalt about other configurations and operations, the explanation is omitted.

[0119] Some technique can be considered for the assessment approach of the hydrogen storage capacity in the hydrogen storing metal alloy tanks 90a and 90c. As a primary method, the amount of hydrogen which carried out occlusion to either of the hydrogen storing metal alloy tanks 90a and 90c or its both first is measured, and this value is inputted into the terminal 19 or the server 31, and let this be basic data. Assessment of the amount of energy storage and the burst size of stored energy installs a capacity detector etc. in the hydrogen duct 100 to which the hydrogen storing metal alloy tanks 90a and 90c are connected, and measures the amount of migration hydrogen between both tanks.

[0120] Moreover, as an option, the PTC curve which shows a pressure (P), temperature (T), and the balanced property of a presentation (a hydrogen storage capacity, C) is beforehand measured about the hydrogen storing metal alloy ingredient in hydrogen storing metal alloy tank 90a and 90c, and the occlusion possible amount is calculated.

[0121] The conceptual diagram of the PTC curve of a hydrogen storing metal alloy ingredient is shown in drawing 16 . An axis of ordinate shows the pressure P of occlusion hydrogen, and an axis of abscissa shows the amount of occlusion hydrogen (H) per hydrogen storing metal alloy (M) unit quantity. if hydrogen storage capacity H/M per [which has been set to constant temperature T1] hydrogen storing metal alloy ingredient unit is made to increase, hydrogen pressure P will increase and hydrogen pressure P will serve as the pressure P1 of about 1 law from a certain presentation nA in the field of nB. When hydrogen storage capacity H/M is furthermore increased, hydrogen pressure P shows again rapid lifting. This presentations nA and nB and hydrogen P1 differ from each other a little, when desorbed from the hydrogen storing metal alloy from the hydrogen which carried out occlusion. That is, a fixed hysteresis will be produced if occlusion of hydrogen and actuation of desorption are performed. That is, desorption is performed with hydrogen absorption so reversibly that the field from presentation nA to nB has the small change by the equilibrium of equilibrium pressure P1 and a hysteresis is small. The magnitude of these equilibrium

ranges and a hysteresis differs, if temperature T differs. The presentation range from n_A which is in equilibrium as much as possible to n_B is wide, and the hydrogen equilibrium pressure P_1 is a flat (change is), and the hydrogen storing metal alloy ingredient which can be applied has a small hysteresis, and it is desirable for the smallness of this equilibrium composition by the temperature change, or a hydrogen pressure and a hysteresis not to change.

[0122] Generally, 250-degree-C or more range of the actuation temperature of Stirling engine 51 is less than 500 degrees C, and it is desirable to include the temperature from which hydrogen absorption desorption is carried out to this temperature field by the pressure also with the hydrogen storing metal alloy of each hydrogen storing metal alloy hold machine 91 in hydrogen storing metal alloy tank 90a in condensing section 50a near atmospheric pressure (field of equilibrium). The hydrogen storing metal alloy ingredient with which each hydrogen storing metal alloy hold machine 91 in hydrogen storing metal alloy tank 90a is filled up is chosen from this viewpoint. As the ingredient, the magnesium system alloy ingredient of the presentation which permuted some of Mg or nickel of Mg_2 nickel or Mg_2 nickel with one sort or two or more sorts of transition-metals elements or rare earth elements can choose as an example.

[0123] On the other hand, in hydrogen storing metal alloy tank 90c in a thermostat 102, in order to use the generating heat and cooling water from the generation-of-electrical-energy facility 11 for temperature control, the width of face of a temperature field is larger than hydrogen storing metal alloy tank 90 of condensing section 50a a. Cooling water is usually -10-degree-C or more temperature requirement 50 degrees C or less, and since it can choose cooling water, steam, waste gas, etc. as a heat source of the generation-of-electrical-energy facility 11, it serves as 30-degree-C or more temperature requirement hundreds of degrees C or less. Therefore, the hydrogen storing metal alloy ingredient with which each hydrogen storing metal alloy hold machine 91 of hydrogen storing metal alloy tank 90c in a thermostat 102 is filled up is chosen in consideration of this point. Although the hydrogen storing metal alloy ingredient

to choose is considered [that it is various and] As an example, as an ingredient which has the temperature of an equilibrium range at the low temperature below a room temperature with atmospheric pressure Titanium system alloys, such as $Mi_{1.2}Cr_{1.2}Mn_{0.8}$ and $Ti_{1.2}CrMn$, and a $MmNi_5$ system alloy as an ingredient which has the temperature of an equilibrium range at the inside low temperature of about 60 degrees C from a room temperature Calcium alloys and $TiFe(s)$, such as $CaNi_5$ and $CaxNiyMmzAlw$, Titanium system alloys, such as $TiFe_{1-x}Mnx$, $Ti_{1.2}Zr_{0.2}Cr_{1.2}Mn_{0.8}$, and $FeTi_{1.13-19wt\%Fe}Ti_{10O3}$ As an ingredient which has the temperature of an equilibrium range in the temperature requirement where the high temperature hot water from a room temperature to about 100 degrees C is applied Zirconium system alloys, such as $Zr_{0.8}Ti_{0.2}(Fe_{0.75}V_{0.15}Cr_{0.1})_2$, and $LaNi_5$, $LaNi_{5-x}Al_x$, Rare-earth-elements system alloys, such as $MmNi_{5-x}Al_x$ and $LmNi_5$, as an ingredient which has the temperature of an equilibrium range in the temperature requirement to 100 degrees C or more about 200 degrees C where the inside low temperature gas of steam etc. is applied Titanium system alloys, such as rare-earth-elements system alloys, such as $LaNi_{5-x}Al_x$, $TiFe_{1-x-y}Ni_xV_y$ and $Ti_{1.1}Fe_{0.8}nickel_{0.2}Zr_{0.05}$, and $TiCo_{0.5}Fe_{0.5}V_{0.05}$, can be chosen.

[0124] however, the sealing performance of the hydrogen storing metal alloy tanks 90a and 90c or each hydrogen storing metal alloy hold machine 91 be high, and since hydrogen absorption and the balanced property of desorption also change by the pressure range which can be choose spread, perform surface treatment, such as suitable coat formation of an alloy ingredient particle, control the particle size of an alloy ingredient particle, or be fill up with two or more sorts of alloys, selection application may be able to be carry out, without not necessarily adhere to the above-mentioned conditions.

[0125] moreover, about hydrogen storing metal alloy tank 90 of condensing section 50a a, and hydrogen storing metal alloy tank 90c of a thermostat 102 If required, will contain more than one every, and both these hydrogen storing metal alloy tanks are connected with a serial, juxtaposition, or a serial parallel

with a hydrogen duct and a closing motion valve. It is also possible to carry out desorption of the occlusion hydrogen from the hydrogen storing metal alloy by more effective and efficient heat utilization and hydrogen absorption to this alloy, and to aim at buildup of the amount of energy storage and buildup of storage / bleedoff rate. This example is shown in drawing 17 .

[0126] That is, the hydrogen storing metal alloy tanks 90a and 90b were formed in condensing section 50a, the hydrogen storing metal alloy tanks 90c and 90d were formed in the thermostat 102, and each hydrogen storing metal alloy hold machine 91 of both in these hydrogen storing metal alloy tank was opened for free passage with the hydrogen duct 100, and the closing motion valve 101,111,112 is formed in each of that hydrogen duct 100. In the case of energy storage, it is desorbed from the hydrogen storing metal alloy of the hydrogen storing metal alloy tanks 90a and 90b to occlusion hydrogen, it is moved to the hydrogen storing metal alloy tanks 90c and 90d, and occlusion is carried out to a hydrogen storing metal alloy. On the contrary, in case stored energy is emitted, it is desorbed from a hydrogen storing metal alloy tanks [90c and 90d] hydrogen storing metal alloy to occlusion hydrogen, it is moved to the hydrogen storing metal alloy tanks 90a and 90b, and occlusion is carried out to a hydrogen storing metal alloy.

[0127] It is easing the occlusion which falls by adopting such a configuration for the temperature gradient generated by the income and outgo of hydrogen absorption and the heat of reaction in the case of desorption, or the amount of desorption hydrogen, and is *****. Moreover, even if a hysteresis is large to some extent, the hydrogen storing metal alloy ingredient which was excellent in hydrogen absorption capacity can be applied, and more effective and efficient energy storage and bleedoff can be realized.

[0128] For example, if hydrogen storing metal alloy tank 90b is filled up with the hydrogen storing metal alloy ingredient with the more high (in atmospheric pressure) temperature of an equilibrium range even if the temperature rise of condensing section 50a happens, since hydrogen desorption was carried out by

hydrogen storing metal alloy tank 90a when performing energy storage, only compared with hydrogen storing metal alloy tank 90a, while the pressure variation of condensing section 50a has been more small, accommodation of the amount of energy storage can be performed, and energy storage will become possible by effective hydrogen migration. Moreover, when moving the hydrogen from which it was desorbed to a thermostat 102 with the hydrogen duct 100, The occlusion of the hydrogen can be effectively carried out by filling up hydrogen storing metal alloy tank 90c with a hydrogen alloy ingredient with the comparatively high temperature of an equilibrium range for the comparatively high hydrogen gas of temperature first. If the hydrogen to which it furthermore moved and temperature fell fills up hydrogen storing metal alloy tank 90d with the hydrogen storing metal alloy ingredient with the low temperature of an equilibrium range from hydrogen storing metal alloy tank 90c, it can carry out occlusion of the hydrogen to this alloy effectively, and is desirable. In addition, deformation implementation is variously possible for this invention in the range which is not limited to each above-mentioned operation gestalt, and does not change a summary.

[0129]

[Effect of the Invention] As more than stated, according to this invention, the dump power managerial system excellent in the dependability which an electric power utility can secure certainly from a power producer the power or electric energy which a power user needs, and can supply it adequately to a power user can be offered.

[Translation done.]

* NOTICES *

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DESCRIPTION OF DRAWINGS

[Brief Description of the Drawings]

[Drawing 1] The block diagram showing the overall configuration of each operation gestalt.

[Drawing 2] The Stirling-engine generation-of-electrical-energy system of each operation gestalt, a power energy storage system, and the block diagram showing the configuration of the periphery.

[Drawing 3] Drawing showing the configuration of the example of the Stirling-engine generation-of-electrical-energy system in the 1st operation gestalt.

[Drawing 4] Drawing showing the configuration of the example of the accumulation-of-electricity unit in the 1st operation gestalt.

[Drawing 5] The flow chart for explaining the supplementary current of the accumulation-of-electricity unit in the 1st operation gestalt.

[Drawing 6] Drawing showing the configuration of the modification of the accumulation-of-electricity unit in the 1st operation gestalt.

[Drawing 7] Drawing showing the example of a change of the connection pattern of the capacitor bank in drawing 6 .

[Drawing 8] Drawing showing another example of a change of the connection pattern of the capacitor bank in drawing 6 .

[Drawing 9] Drawing showing still more nearly another example of a change of the connection pattern of the capacitor bank in drawing 6 .

[Drawing 10] Drawing showing change of discharge voltage in case there is nothing with the case where bank switching of the capacitor bank in drawing 6 occurs.

[Drawing 11] The flow chart for explaining the supplementary current of the capacitor bank in drawing 6 .

[Drawing 12] The flow chart for explaining an overall operation of the 1st operation gestalt.

[Drawing 13] The flow chart following drawing 12 .

[Drawing 14] Drawing showing the configuration of the example of the Stirling-engine generation-of-electrical-energy system in the 2nd operation gestalt.

[Drawing 15] Drawing in which carrying out the cross section of the configuration of the hydrogen storing metal alloy hold machine in the 2nd operation gestalt, and showing it.

[Drawing 16] Drawing showing the concept of the PTC curve of the hydrogen storing metal alloy ingredient in the 2nd operation gestalt.

[Drawing 17] Drawing showing the configuration of the modification of the Stirling-engine generation-of-electrical-energy system in the 2nd operation gestalt.

[Description of Notations]

1 [-- Generation-of-electrical-energy facility,] -- An electric power company transmission network, 2 -- A communication network, 10 -- A power producer, 11 13 -- An instrumentation, 14 -- A terminal, 15 -- Stirling-engine generation-of-electrical-energy system (auxiliary generation-of-electrical-energy means), 16 -- power energy storage system (energy storage means) 17a and 17b-- electromagnetism -- a breaker -- 18 [-- Building,] -- The power line, 19 -- A terminal, 20 -- A consumer (power user), 21 22 [-- A server, 40 / -- Generator,] -- An instrumentation, 23 -- A terminal, 30 -- An electric power utility, 31 50 [-- A generator, 53 / -- Heat carrier tubing, 54 / -- A closing motion valve, 71 / -- An AC/DC converter, 73 / -- An accumulation-of-electricity unit, 77 / -- An inverter, 78 / -- Protection control section] -- An extraction unit, 50a -- The condensing section, 51 -- A Stirling engine, 52

[Translation done.]

* NOTICES *

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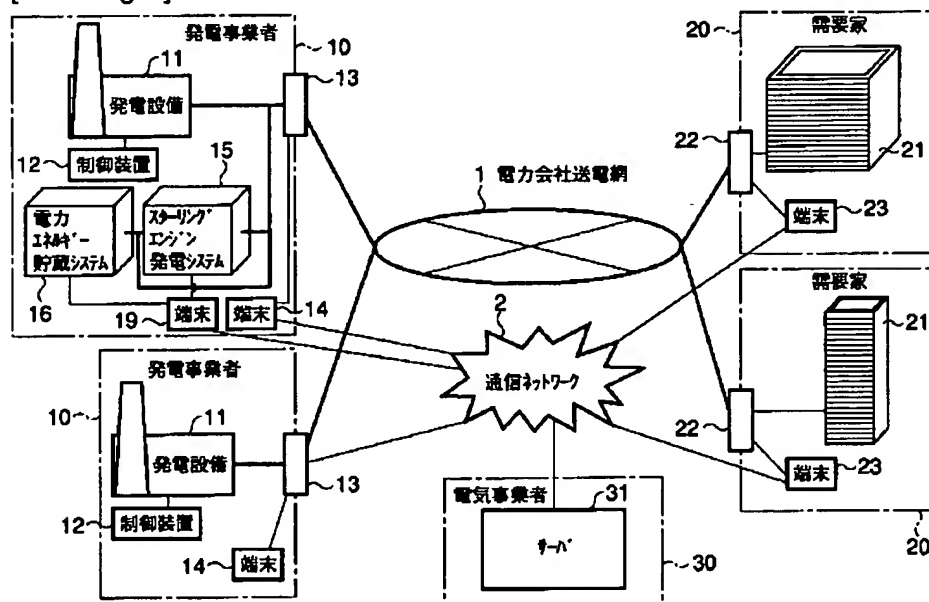
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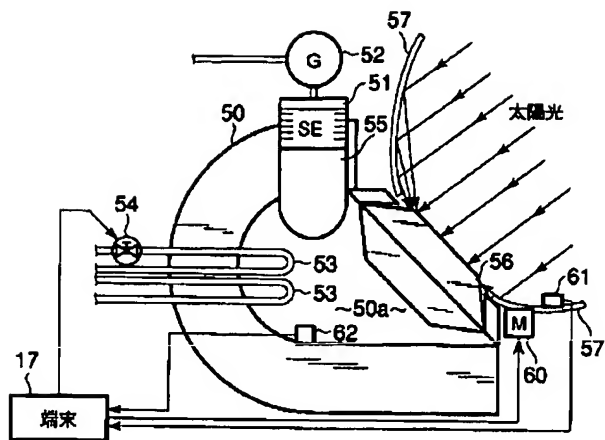
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DRAWINGS

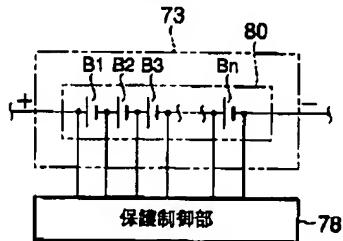
[Drawing 1]



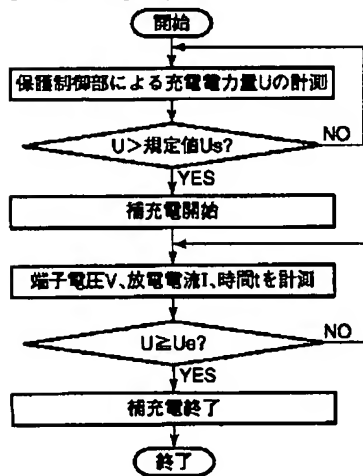
[Drawing 3]



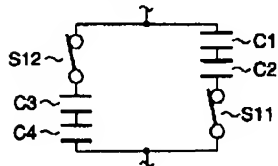
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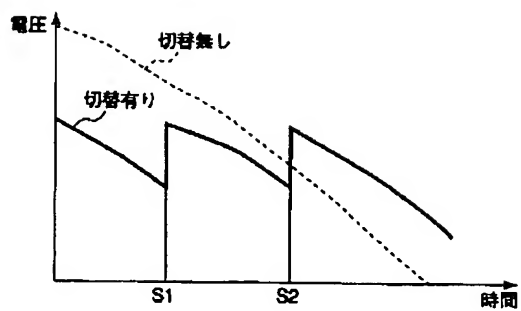


[Drawing 5]

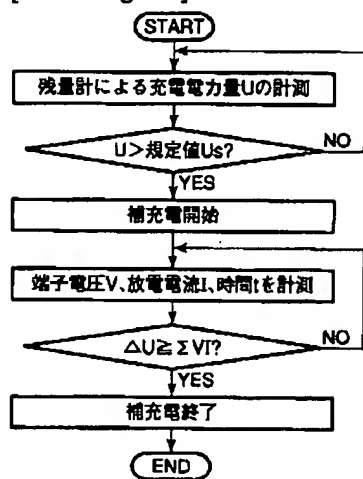


[Drawing 7]

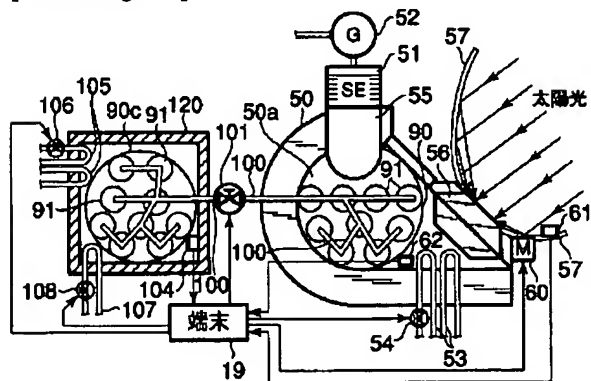




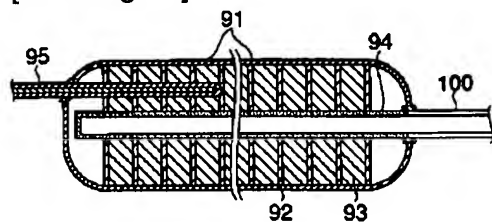
[Drawing 11]



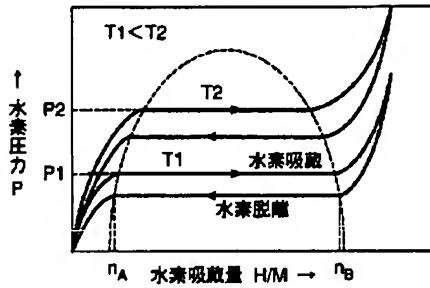
[Drawing 14]



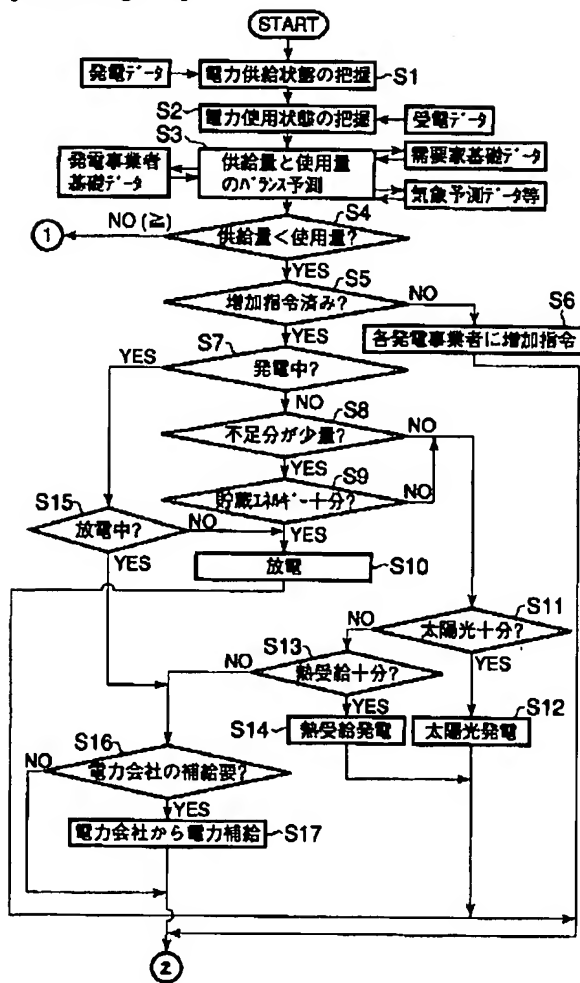
[Drawing 15]



[Drawing 16]



[Drawing 12]



[Drawing 13]

